MARINE REVIEW

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BILLS OF LADING.

SHIP OWNERS OF THE GREAT LAKES TAKE A FINAL STAND IN SUPPORT OF DEMURRAGE FOR DETENTION IN UNLOADING EITHER GRAIN OR COAL — SHORTAGE CLAUSE IN THE GRAIN BILL OF LADING TO HOLD OVER FOR A YEAR, BUT AN EFFORT WILL BE MADE TO ENFORCE OTHER CHANGES—UNIFORM COAL BILL OF LADING.

After another full day's struggle with the grain bill of lading problem in Cleveland, Tuesday, the executive officers and committees of the Lake Carriers' Association who have had the matter in charge are determined upon final action. The formation of an elevator pool in Buffalo, and the promise of the trunk line railways to accept delivery of grain at elevators other than their own, will certainly offer relief to the vessels in the matter of detention during the coming season, but the ship owners are not satisfied that there is stability enough in this arrangement, and have insisted upon placing a detention clause in the bill of lading, together with a clause making delivery to the party to whom consigned a good delivery, but giving up for the present season any attempt to change the rule as to shortage. This is in short the conclusion of Tuesday's meeting. President F. J. Firth and Secretary C. H. Keep are to send out to members of the association a letter dealing with the new clauses of the bill, just as they are to appear in the document, and asking for an answer as to what may be expected of each member. It is understood that the regular lines can not, on account of their railway connections, support this movement, but the majority of owners at Tuesday's meeting seemed determined that the matter should be brought to an issue; that if there was not strength enough in the association to carry into effect a clause calling for demurrage on account of unreasonable detention, they wanted to know it, especially as the grain interests had admitted on all hands that unreasonable delay was unfair to the vessel, and in view also of the fact that for this season the proposed shortage clause was to be allowed to rest.

A uniform coal bill of lading was also agreed upon and will be submitted to the entire membership of the association for endorsement, which it is expected will be unanimous. In taking action on this measure, as well as in proposed changes of the grain document, the vessel men secured, after a little struggle, the promise of James Davidson of West Bay City, who is not a member of the association, but a very large vessel owner, that he would stand by them in all their actions.

Among vessel men other than Cleveland members of the committees at Tuesday's meeting were President F. J. Firth of Philadelphia, J. J. H. Brown and E. T. Evans of Buffalo, L. C. Waldo and J. W. Westcott of Detroit, C. W. Elphicke and Capt. J. A. Calbick of Chicago, A. W. Colton of Toledo, James McBrier of Erie and James Davidson of West Bay City. An important letter read at the opening was from Secretary Cook of the Western Elevating Association, giving information of the reorganization of the Buffalo elevator pool. "I have been directed to inform you," Mr. Cook said, "that an association has been formed at this port comprising all the elevators having railroad connections, which insures a uniform rate for handling grain at all those houses this season. There has also been appointed a 'committee of control,' consisting of Mr. Sowerby, the president, and Messrs. G. L. Douglas and E. T. Evans, whose duty it will be to arrange the placing of vessels for the coming season, so they will have prompt despatch in discharging, thereby avoiding a repetition of the very annoying and expensive delays of the past season. The same committee will also arrange, so far as practicable, to have the different consignments on a vessel unloaded at one elevator, thereby saving the vessels both time and expense of towing."

This letter, together with the announcement from the Trunk Line Association that each trunk line will during the coming season accept deliveries of grain at any of the several elevators in addition to their own, showed first that agitation of the bill of lading subject by the vessel men had done more than anything else to bring about the organization of an elevator pool in Buffalo, and secondly that President Firth of the Lake Carriers' Association had been at work with the trunk line officials and with the elevators to offer to the vessels all that the port of Buffalo affords in the way of facilities. Mr. E. T. Evans, as a member of the Buffalo committee of control, explained that it would be the effort of that committee to secure from vessel agents advance notices of all grain arrivals, and with this information in hand before the coming of the vessels every effort would be made to secure prompt unloading. It was proposed that the vessel interests should be represented on this so-called committee of control, probably by two of the Buffalo vessel agents and Secretary Keep, this with a view to taking up also where it was possible to do so out of court the settlement of demurrage charges, shortages, etc., or the reference of such matters to arbitration at the hands of Buffalo commercial bodies. But it was evident, after a lengthy discussion, into which a great many other matters were introduced, that there would be nothing permanent or binding in such an arrangement. All were willing to give up for this year the shortage feature of the bill of lading, but a detention clause was demanded. The original detention clause provided in substance that the cargo should be discharged at not more than two accessible elevators with facilities for discharging at the ordinary rate per hour of the port of discharge, for furnishing which twenty-four hours should be allowed after arrival of vessel, and failing in which a certain demurrage should be paid to the vessel. Mr. Firth pointed out difficulties, especially in relation to numerous cornsignments in one cargo, which he said seemed insuperable in enforcing such a clause. He admitted that he had been unable to work out a detention clause that might be inserted in the bill of lading and which would not be uncertain and indefinite. The answer to this from the vessel standpoint was that all interests in grain admitted that the vessel should not be unreasonably delayed and so it would rest with the elevator and grain men to find means of caring for the cargo if such a clause was inserted. Then Mr. Firth said that the trunk lines of railway controlling the organized lake lines between Duluth, Chicago and Buffalo would not support such a proposition. He was endeavoring to avoid any lack of united action on the part of the ships, but other vessel owners seemed willing to undertake the enforcement of the detention clause irrespective of the action of the regular lines. This view of the matter was supported by Mr. H. Coulby, representing Pickands, Mather & Co., Mr. L. M. Bowers of the Bessemer Steamship Co., Capt. Thomas Wilson, Mr. James Corrigan, Mr. L. C. Waldo of Detroit and several other representatives of very large vessel interests, and it was finally agreed that such a course would be undertaken unless it was found inadvisable after the matter had been submitted to the full membership of the association. The clause making delivery to the party to whom consigned a good delivery meets with no objection from the vessel interests and will be used in the new bill of lading. The vessel owners still insist that they should not be called upon to guarantee the outturn of grain, but they propose that the question of shortage go over for another year in view of the disturbance that would result in the financing of the grain business on account of a hasty change in the shortage clause. It is expected, however, that in the meantime some plan of insurance against shortage will be arranged, or some method adopted whereby the vessel will be reimbursed for guaranteeing shortage.

COAL BILL OF LADING.

For a long time past the association has talked of adopting a uniform coal bill of lading—one that would protect the vessel against unreasonable delay at the port of discharge. All kinds of bills of lading have been used in the past, especially in the soft coal trade. It has been said that in several instances documents of this kind in the soft coal trade have contained a clause to the effect that neither the shipper nor consignee should be held liable for delay in loading or unloading. This is not true of the hard coal trade and there has been no special complaint on account of delay in that trade, but last season the delays to which vessels taking soft coal to the Portage district on Lake Superior were subjected caused general complaint and justly so. This is what prompted the present action.

A committee consisting of W. C. Richardson, H. A. Hawgood and John Mitchell was appointed some time ago to prepare a detention clause for bills of lading relating to soft coal. The clause submitted is as follows: "It is agreed the vessel shall be furnished a dock with good facilities at which to begin discharging cargo within thirty-six hours of her arrival, and for all the time lost thereafter waiting for a dock (Sundays and holidays excepted) the cargo shall pay said vessel demurrage at the rate of 5 cents per ton of cargo for each twenty-four hours or part thereof."

When the question of inserting a similar clause in bills of lading relating to hard coal was raised, it was proposed that in the hard coal trade a dock at which to unload should be furnished within twenty-four hours, which is now the custom, but it was deemed advisable not to make a difference as betwen the two similar lines of trade, and so the bills of lading relating to hard coal will contain this same clause. As the agreement in chartering vessels to load coal at Lake Erie ports usually covers the time of loading, it was not thought necessary to have the bill of lading refer at all to the time allowed for putting cargo aboard. Secretary Keep is requested to send copies of this bill of lading to all coal shippers, and to secure the signatures of all members of the association to an agreement that they will use only the new document.

ORE REBATES TO FURNACE COMPANIES.

Considerable surprise was occasioned at the meeting when Mr. L. M. Bowers, general manager of the Bessemer Steamship Co. (Rockefeller fleet), made known his position with reference to the recent advance from 14 to 16 cents a ton in the charge for unloading ore from vessels at Lake Erie ports. Capt. James Davidson brought the matter up by moving that a committee be appointed to confer with the dock owners with a view to having them reconsider their action. He was disposed to blame the ore interests for first inducing vessel owners to accept a low rate on ore carrying contracts—60 cents from the head of Lake Superior—and then putting up the unloading charge. This criticism was based on the claim, of course, that the docks were controlled by the ore shippers. The motion for the appointment of this committee was carried, and President Firth promised to name the members later. It was evident that there was no hope for redress this year, but the discussion was enlivened by Mr. Bowers declaring that although his principals own and operate a dock at Ashtabula, he was very much opposed to the recent advance, and if he had been able to attend the meeting of dock managers in Cleveland when the advance was made, a few days ago, they would have heard from him very plainly regarding the present method of dock management. The system that permits of large rebates to furnaces by the docks, he says, is the most iniquitous thing that confronts the vessel owner. The principle is decidedly wrong and the question should be taken up and fought out by the vessel owner, who should pay only for the shoveling of the ore and not for the transfer of it to stock piles.

LAKE SUPERIOR POWER CANAL.

THE SAULT PROJECT IS HELD UP ON ACCOUNT OF EAGERNESS TO PUSH MATTERS BEFORE FULL AUTHORITY HAD BEEN RECEIVED FROM CANADIAN OR AMERICAN GOVERNMENTS--AN INTERNATIONAL MATTER.

Officers of the Lake Superior Power Co. are anxious that the vessel interests of the lakes should be informed regarding its plans for power development at the Sault, although it would seem from what can be learned of the action of the board of United States engineers appointed to investigate this matter, that the promoters of the scheme are meeting with disappointment in not having first made their position secure by a satisfactory understanding with both the United States and Canadian governments. It will be remembered that the last annual report of the board of managers of the Lake Carriers' Association called attention to the work being done by this company at the Sault, and pointed out some possible dangers to navigation in case the interests of navigation were not thoroughly safe-guarded. The power company therefore sent the following letter to Mr. F. J. Firth, president of the association, with the request that it be given publicity among vessel owners:

Mr. Frank J. Firth, President Lake Carriers' Association, Philadelphia—Dear Sir: Agreeable to your request for some information relating to the projected water power development which is now in course of construction at Sault Ste. Marie, Mich., especially as affecting the condition of lake levels, I take pleasure in forwarding to you the following synopsis of matters which are pertinent to the above subject:

The original projects for the present undertaking, namely, the development of 60,000 horse power, were prepared in the fall of 1896, resulting in a report, plans and estimates, submitted to this company by our engineer in February, 1897. In this report special attention was called to the probable effect which the withdrawal of the volume of water required for the power development would have upon the level of Lake Superior, and that such effect would not only seriously interfere with the interests of lake navigation but would also be a menace to the constancy of the head upon which the power development had to rely. The importance of this matter was easily recognized by this company, and immediate steps were taken to fully investigate the subject, in order to secure definite data as to the lowering of Lake Superior and proper remedy to counteract the same. Detail surveys of the discharge section at the "Soo" rapids were made during the months of March and April, 1897, and Mr. Alfred Noble, civil engineer of Chicago, was retained to examine into and report his conclusions on the whole matter. Mr. Noble rendered his report during the latter part of May, 1897, his conclusions and recommendations being in substance as follows:

First. That the withdrawal of 30,000 cubic feet per second (this being the volume required for the contemplated development) would in course of years lower Lake Superior level probably 2 feet.

Second. That a reduction of the Soo rapids section for an area equal to such as now passes 30,000 cubic feet per second by an ordinary dyke, constructed from either shore would prevent the lowering of Lake Superior level beyond its present low range but would raise the high level to an extent resulting in damages to existing dock and shore improvements.

Third. That the construction of a submerged weir about 650 feet long would not only accomplish the reduction of the present outflow area in an amount equal to the volume to be withdrawn, but would also leave a sufficient section for the safe outflow of the higher stages of Lake Superior level. In other words, such a structure, Mr. Noble concludes, would, within the limit of about 4 inches, regulate the level of Lake Superior as between the ranges of extreme low or high water.

Mr. Noble accepted, for the data upon which his investigations were based, the results of the discharge measurements of the "Soo" rapids made by the United States engineer corps in fall and winter of 1896, (which were in close agreement with the results obtained by measurements made by this company), by which the low water discharge was found to be about 62,000 and the high water 90,000 cubic feet per second. For the extreme low stage Mr. Noble accepted an elevation of 600.3 for high water, 603.5 feet above mean tide in New York, these being extreme low and high monthly means of official records from 1872 to the present period.

This company accepted Mr. Noble's report, and plans and estimates for the construction of remedial works as recommended by him were made and incorporated in the final construction projects and estimates in connection with the contemplated water power development. As soon as important financial details had been satisfactorily adjusted, the company in July, 1898, called for tenders on the various constructions, and at once prepared to make an application to the secretary of war for permission to divert water from the St. Mary's river above the rapids to a point below the rapids, such consent to be conditioned upon the construction by this company of the remedial works recommended by Mr. Alfred Noble, and the providing of suitable arrangements in the power house to guarantee the uninterrupted withdrawal of a constant volume of water. This application was filed with the department at Washington in September, 1898, whereupon the secretary of war appointed a commission of United States engineer officers to examine into the plans and projects relating to the contemplated development and to report as to the influence which such development might have upon the interests of lake navigation. This board of engineer officers was organized in October, 1898. They fully examined this company's plans as presented to them by Mr. Alfred Noble and our engineer, and it is believed that they have at this writing concluded their investigations. Should above representation fall short of fully informing you on this matter, I beg you to so advise me.

THE LAKE SUPERIOR POWER COMPANY,
E. V. DOUGLAS, President.

Philadelphia, Feb. 21, 1899.

The board of engineers above referred to, which consisted of Lt. Col. G. J. Lydecker, Lt. Col. C. W. Raymond and Major T. W. Symons, has finished its investigations, but the result is probably not satisfactory to the power company. The board did not approve the plans or request of the Power company for the general reasons that they did not consider them founded on sufficiently accurate knowledge in regard to the flow of the river, but more particularly because they considered the matter should be referred to an international board representing the United States and Canadian governments, which board should make rules and regulations governing the use of the water for power purposes and should prescribe such regulating works as might be deemed necessary.

The matter is a complicated one involving a great many and very important interests, and the board of engineers deemed that the present vested interests in the navigation of the river and the locks was of infinitely greater moment and value than a speculative enterprise looking to the development of power, and were unwilling to risk any injury to these navigation interests.

It is understood that this company has been warned from the beginning that they should get their affairs on a basis satisfactory to the government before they commenced operations, but they chose to go ahead in a more or less reckless way, trusting to get their affairs in shape some way or other.

As the navigation interests are so great, and as this river is an international river, and as deflections from the natural channel can be made on either side, it would seem from a common-sense view of the matter that all operations in these waters influencing navigation should be looked after by an international board, or at least under international regulations. This may be a little hard on the Power company, but it has only itself to blame for getting into the condition it has in its eagerness to push matters before full authority had been received.

SPANISH IRON ORES—DIMINISHING SUPPLIES.

Spain has always been a great iron ore producing country. Recently compiled statistics of the production of ore in that country will therefore prove of interest in view of the output of more than 14,000,000 gross tons attained in the Lake Superior region last year. The production of Spanish iron ores during 1897 and 1898, expressed in metric tons was as follows:

	1897.	1898.	Changes.
Viscaya	5,254,492	4,973,000	Dec. 281,492
Santander	749,404	790,000	Inc. 40,596
Murcia	426,400	416.000	Dec. 10,400
Sevilla	388,443	391,000	Inc. 2,557
Almeria	395,165	363 000	Dec. 32,165
Other provinces	205,864	192,600	Dec. 13,264
Totals	7,419,768	7,125,600	Dec. 294,168

The total decrease was 4 per cent., and the reduction in the province of Viscaya represents nearly the whole of this. The consumption of iron ore in Spain in 1898 was 554,772 tons, or only 7.8 per cent. of the total, the balance being exported. The meagreness of home consumption will be understood when it is stated that in 1898 the output of pig iron in Spain amounted to only 261,799 tons; Bessemer steel ingots, 54,500 tons; open hearth ingots, 58,105 tons; finished iron and steel, 8,590 tons. Of the pig iron produced last year 16,800 tons were made with charcoal; the rest with coke or coal, chiefly coke. The exports of pig iron were 46,105 tons, against 43,943 tons in 1897, showing an increase of 2,612 tons, or 6.1 per cent. The destinations of the iron ore exported were as follows:

	1897.	1898.	Changes.
Great Britain	5,091,027	4,748,557	Dec. 242,470
Germany	1,058,694	1,193,924	Inc. 125,230
France	435,972	399,424	Dec. 36,548
Belgium	224,776	201,693	Dec. 23,083
Austria	10,350	8,650	Dec. 1,700
United States	59,243	5,792	Dec. 53,456
Italy	.....	20	Inc. 20
Sweden	4,526	.....	Dec. 4,526
Totals	6,884,588	6,558,060	Dec. 326,528

The chief producers or iron ore were the Orconera company and the Societe Franco-Belge, both of Bilbao. The reduction in exports was due to a diminished supply of ore rather than to any decrease in demand.

The Goodrich Transportation Co. is now prepared to undertake all kinds of repair work to machinery and also joiner work at its Manitowoc shops. These repair shops include complete carpenter and joiner department, new machine shop, and blacksmith shop with steam hammer, punch and shears, etc., as well as brass foundry. They are adjacent to the dry dock and are equipped with the best modern machinery—portable electric drills, complete electric power plant for supplying motors on board ship, and for lighting. There is 20 feet of water alongside the shops. All work will be in charge of skilled mechanics.

In this age of electricity driven machinery, the electric fan is taking its place as an important factor in ventilation and heating, mechanical draft and many other applications. The possibilities in the way of design and construction to suit special conditions are very clearly shown in Bulletin H., recently issued by the B. F. Sturtevant Co. of Boston, Mass.

The United States government has purchased at Hong Kong the tugs Lee Fat, Kum Hing and Kar Shun for use in Manila bay and the Philippines. Each tug is of 100 tons burden, 14 feet beam and 8 feet draught.

Grain shoveling in Cleveland is to cost $2.50 per 1,000 bushels during the coming season. The work is to be done by Martin Connors, who has entered into an agreement with the vessel owners.

We are very much in need of a few copies of our issue of Feb. 2, 1899, and will pay a liberal price for them. Address Marine Review Pub. Co., 418-19 Perry-Payne building, Cleveland.

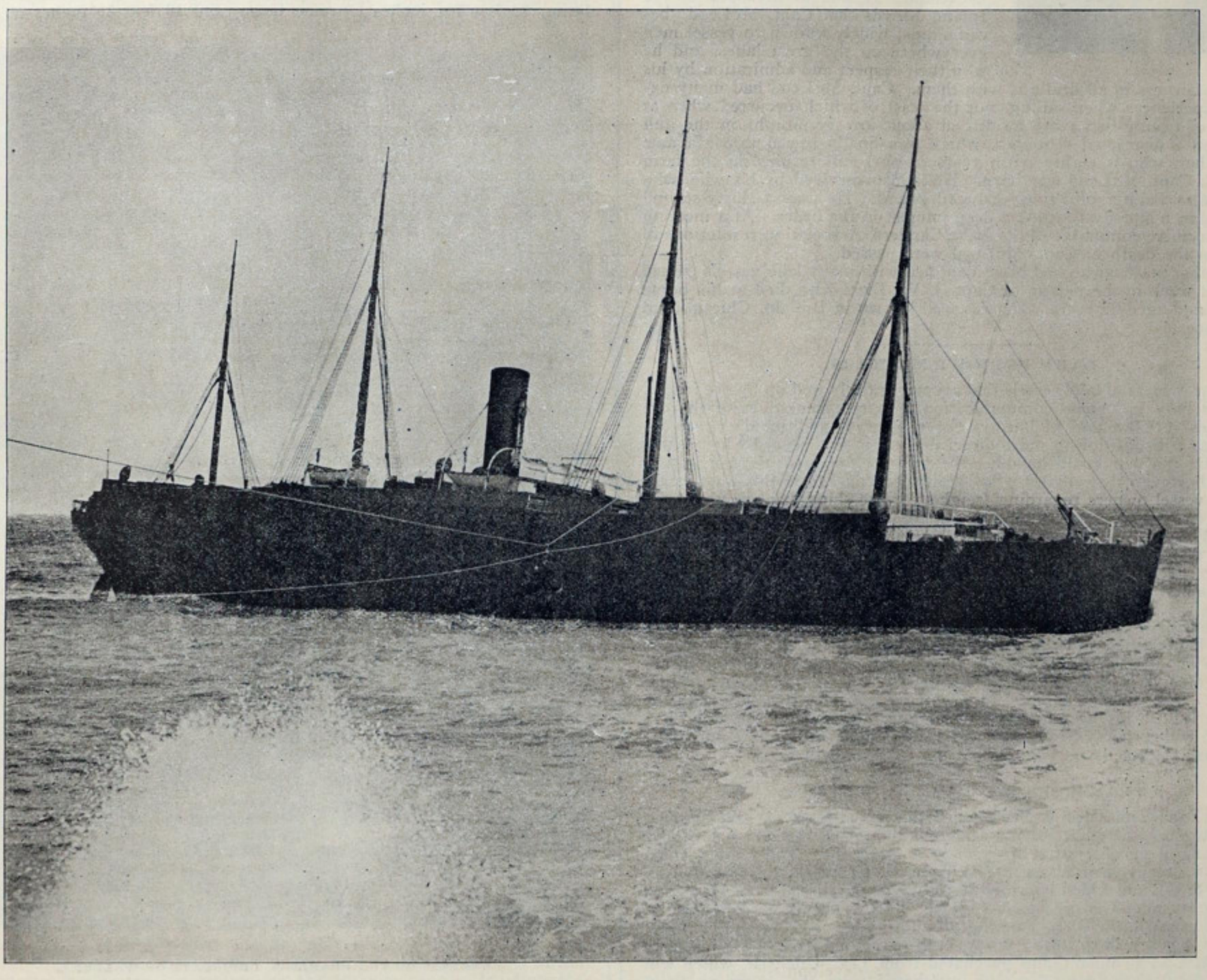
FLOATING THE NORSEMAN.

THE WARREN LINE STEAMER ASHORE ON MOORE'S LEDGE, OFF MARBLEHEAD NECK, MASS., FINALLY RELEASED AFTER EIGHT DAYS OF STEADY WORK.

Ingenious methods were followed to float the Warren line steamer Norseman, bound from Liverpool to Boston, which went ashore March 30 on Moore's ledge, about 200 yards off Marblehead Neck, Mass. An examination showed that the greatest damage to the vessel was a jagged hole 4 feet square in the forward portion of the hull. The wreckers battened down the hatch on the lower deck and then held it tightly in place by a series of shores braced against the upper decks. The water filled the entire hold below the lower deck. After these preliminary preparations had been made the pumps, each throwing 2,850 gallons of water per minute, were put to work, and as a result the water poured through the large leak with great force and striking against the lower deck assisted in buoying up the vessel. The large hole mentioned was located about 25 feet from the bow on the starboard side and other holes of smaller dimensions were found along the bottom as far aft as the engine room, and these were stopped in the usual manner with canvas and boards.

The Norseman was built by Laird Bros. at Birkenhead in 1882. She is a vessel of 2,834 net or 4,450 gross tons burden, and is 392 feet in length, 44 feet beam and 25 feet depth of hold. She is owned by the British and North Atlantic Steamship Co., of which Messrs. Richards, Mills & Co. of Boston, the owners of the Dominion line, are the managers, but has been under charter since her construction to the Warren line. She is fitted with compound engines with cylinders 48 and 84 inches in diameter by 60 inches stroke and of 486 indicated horse power. She has a steel hull, four pole masts and is schooner rigged. The valuation of the steamer is said to be not far from $400,000, and she is insured in the British club companies, her cargo being also insured abroad. The Norseman was two days late in leaving Liverpool, having been held to take the freight intended for the Cambroman, which has been withdrawn from the Boston service in order to take the place of the lost steamer Labrador in the Halifax-St. John's trade.

The stranding of the Norseman was due to a heavy sea and a dense fog which prevailed at the time. When the steamer ran on the ledge she was drawing 21 feet of water, whereas at low water on the day following there was 30 feet of water under her bow and 17 feet under her stern, showing that she had nearly cleared the ledge. A considerable portion of the cargo was lightered, and all was more or less damaged. Arrangements are now being made to dry dock the vessel. The repair job will, of course, be a very expensive one.



WARREN LINER NORSEMAN, ASHORE OFF MARBLEHEAD NECK, MASS.

INCREASE IN ORE DOCK CAPACITY.

A blue print issued within the past few days from the office of Robert Angst, chief engineer of the Duluth & Iron Range Railroad, shows that there will be ready for use at Lake Superior ports at the opening of navigation this year a total of twenty ore docks, containing 4,529 pockets, whose aggregate capacity is estimated at 672,966 tons. This is a decrease of one from the number of docks which have been utilized for several seasons past, but in the number of pockets and the aggregate capacity a considerable increase is shown. For purposes of comparison a table is presented, according to which it would appear that in 1896 there were available twenty-one docks with a total of 4,438 pockets and an aggregate storage capacity of 617,250 tons. Statistics compiled during the season of 1898 gave the total capacity of the twenty-one docks as 623,612 tons.

The ore dock which passed out of existence was No. 2 dock at Escanaba. It had 192 pockets and a capacity of 20,928 tons. The compensation for this loss, as well as the gain of ninety-one pockets having 55,716 tons storage capacity, was effected by the enlargement of three docks. Duluth & Iron Range dock No. 1 was increased from 141 pockets of 18,000 tons capacity to 200 pockets of 40,400 tons capacity; No. 2 of the system from 176 pockets with a capacity of 23,900 tons to 208 pockets with a capacity of 42,000 tons, and dock No. 2 of the Duluth, Missabe & Northern road from 192 pockets with a capacity of 34,560 tons to 384 pockets of 69,120 tons capacity. Of these 283 new pockets 151 pockets with a total capacity of 56,960 tons will be available for the first time this season. Of these latter fifty pockets with a capacity of 22,400 tons are on the docks of the Duluth & Iron Range road, while ninety-two pockets with a total capacity of 34,560 tons are on the Duluth, Missabe & Northern docks.

As showing the general trend of business at this time, it may be noted that the Chicago Pneumatic Tool Co. on Monday last received orders for 158 pneumatic tools, including compressors, drills, hammers, riveters, etc. The orders for these tools are from many different concerns, largely railroads and ship building plants. This company's business for March, 1899, was the largest in its history, being considerably more than double that of March, 1898, and the increase thus far in April is still more marked.

DEATH OF WELL KNOWN LAKE CAPTAINS.

The death in Cleveland on the 10th inst. of Capt. Dan'l McLeod removes one of the best known figures and most popular men in lake shipping circles. Capt. McLeod, whose real name was Donald, although he invariably wrote it and was universally known as Dan'l, was born at New London, Prince Edward island, in 1835. He began sailing as a boy, and continued in the ocean service until 1867 when he came to the great lakes. His first position was as mate of the schooner St. Lawrence and later he became master of the same vessel. In the period intervening between 1870 and 1890 he conducted a ship repair yard at Chicago, and in the latter named year was appointed manager of the Inland Lloyds Register, in which position he continued until 1898, since which time he has been engaged in surveying work with an office in Cleveland. It was as manager of the Inland Lloyds that Capt. McLeod became most widely known to vessel men everywhere on the great lakes, and he won their respect and admiration by his manifest fairness in all dealings with them. Capt. McLeod had many exciting experiences when sailing, not the least of which occurred when at the age of twenty-two years he drifted about for six months in the gulf stream on a dismasted schooner, which was finally towed into Havana. His mother, who is eighty-seven years of age, still resides on the farm on which Capt. McLeod was born. He is also survived by his wife, who was a Miss Palmer of Prince Edward island. He was a thirty-second degree Mason and always took a deep interest in the order. At a meeting of the executive committee of the Lake Carriers' Association resolutions of regret on the death of Capt. McLeod were passed.

Another master who had been identified with many lake vessels passed away last week in the person of Capt. J. W. Brett who died at his home at Cleveland aged 82 years. He was well known in Buffalo, Chicago and Milwaukee.

LAKE FREIGHT MATTERS.

A few owners of lake vessels that are not entirely tied up by ore freight contracts have had some communication with representatives of the ore companies in Cleveland of late on the subject of additional contracts. There was a disposition to more direct dealing in this regard when it was found that nothing could be done through the brokers. It can not be learned, however, that anything has been accomplished in this way, as the ideas of vessel owners regarding freights for the ships that are not under contract engagements are so high that there is little chance of compromise rates. With the first indication of labor trouble in the iron mining region speedily disposed of, there is not now very much fear of disturbance on this score during the season. Although there will be no ore delivered at Lake Erie ports in April of this year, as against unusually large receipts a year ago, the ore shippers may be depended upon to strain every effort to get the business started as early as possible. Both interests—shipper and carrier—have settled down to await the outcome of wild rates. The vessel owner is about ready to take up insurance, but he meets with the disadvantage of very high rates in all talk thus far, and this is another feature of delay. It is said that the best rate on first-class steel steamers, with the collision feature of the policy decidedly less favorable to the ship than last year, will certainly be 4½ per cent., but as definite rates are not being quoted as yet there is no telling what the outcome will be.

TRANSFERS OF VESSEL PROPERTY.

The Tonawanda Iron & Steel Co., Tonawanda, N. Y., is still figuring on the purchase of two wooden steamers, although it was said, a few days ago, that their purchases for this year were at an end. The vessels which they have already secured are the William H. Gratwick, purchased from Mitchell & Co. and which will tow the Moravia, purchased from Hawgood & Avery; steamer George Spencer which will tow the B. L. Pennington, both purchased from B. L. Pennington and others of Cleveland; steamer Veronica, which will tow the Amboy, both purchased from the Milwaukee Tug Boat Co.; steamer Quito purchased from J. C. Gilchrist, which will tow the whaleback barge No. 101, purchased from the American Steel Barge Co.

The Cleveland-Cliffs Iron Co. has purchased for $70,000 the Chattanooga, one of the large wooden schooners constructed last year at the yard of Capt. James Davidson, West Bay City, Mich. She will tow this season behind either the Pontiac or Frontenac. The Chattanooga is a sister vessel of the Chicamauga which Capt. Davidson sold a few weeks ago to W. C. Richardson and others of Cleveland.

The Spaulding Lumber Co. of Chicago has sold its vessels, Worthington, Wilbor and Martin, the first two to S. R. Chamberlain of Chicago and the Martin to A. M. Elliot, also of Chicago.

MR. BOWERS ON ABUSE OF REBATES.

Mr. L. M. Bowers, general manager of the Bessemer Steamship Co., has received much commendation for the stand which he made against the abuse of rebates at the meeting of the executive officers and committees of the Lake Carriers' Association at Cleveland this week. "We can operate our little dock at 14 cents a ton," Mr. Bowers said in conclusion, "and make a highly satisfactory profit out of it. No other business on earth that is managed on right principles would submit for a single day to such a matter as the abuse of rebates in handling ore."

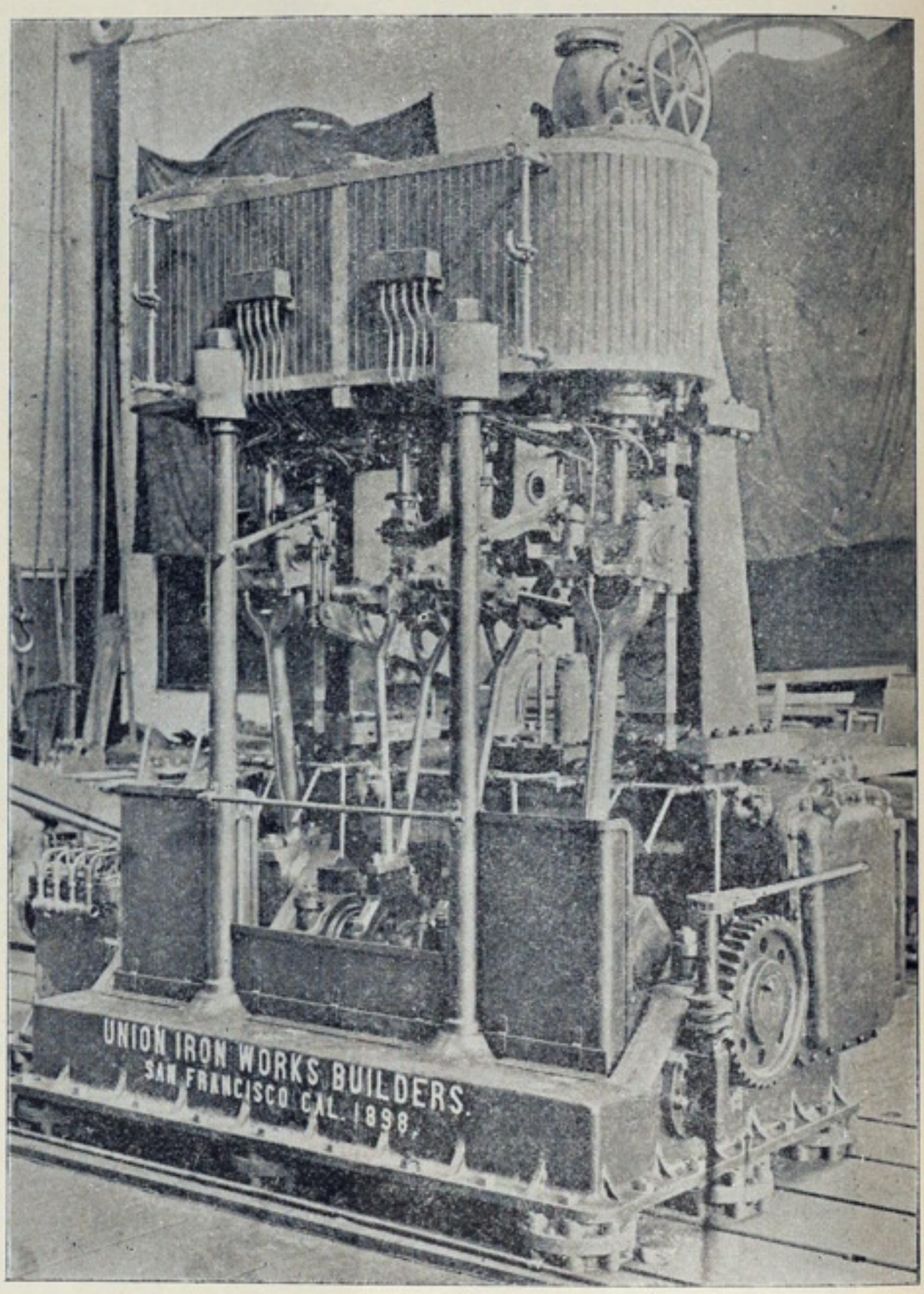
Mr. A. A. Schantz, general passenger agent of the Detroit & Cleveland Navigation Co., has issued his annual pictorial announcement of the opening of navigation, and it is no exaggeration to say that in novelty and artistic claims it is quite the equal of any of its predecessors.

FEARLESS AND WALLULA.

TWO MODERN STEEL TUG BOATS, EMBODYING NEW IDEAS IN CONSTRUCTION, NOW NEARING COMPLETION AT THE UNION IRON WORKS, SAN FRANCISCO.

A considerable degree of interest was aroused some weeks ago in the simultaneous launch of three steel tug boats at the yard of the Union Iron Works, San Francisco. These vessels are now nearing completion. One of them has been constructed on builders' account and will be used by the Union Iron Works for general towing service. The other two, named respectively Fearless and Wallula, are sister vessels and are building for the J. D. Spreckels & Bros. Co. of San Francisco and for the Oregon Railway & Navigation Co. Both these towing steamers will undergo sea service in all sorts of weather, the Fearless being designed for general work in the vicinity of San Francisco, while the Wallula will be in service at the mouth of the Columbia river. The exactions of the work in which they will be engaged necessitate, of course, great strength of hull as well as other special qualifications, as will be appreciated by a glance at the accompanying illustrations.

The tugs Fearless and Wallula are each 100 feet in length on the water line, 106 feet 10 inches in length over all, 22 feet 6 inches moulded beam, 22 feet 7¼ inches extreme beam, and 13 feet 10 inches moulded



ENGINES OF TUG FEARLESS, DUPLICATE OF WALLULA.

depth. They are fitted with two masts, deck houses of steel, iron towing bitts, wrought steel side bitts, steam steering gear, windlass, capstan, wrecking and fire pumps. There is a strong derrick on the foremast of each vessel capable of lifting 7 tons. The guard is of teak, faced with iron bark, and the tugs are equipped with steel bulkheads, the fore and aft compartments being fitted as fresh water tanks.

Engines are of the compound vertical surface condensing type, with cylinders of 20 and 42 inches diameter and 24 inches stroke. There is a piston valve on the high pressure cylinder and a balance slide valve on the low pressure cylinder. Air, feed and bilge pumps are worked from beams on the low pressure engine. Watson's metallic packing is used on rods and stems. The steam reversing gear is located on the upper platform, giving the engineer a view of the tow line through the windows in the after end of the engine room. Other equipment includes an independent centrifugal pump, an auxiliary steam feed pump of Dow's vertical marine type and a Metropolitan injector. The propeller is of Manganese bronze and all piping with the exception of that for the fresh water drinking tank is of copper. The boiler is of the Scotch type, 13 feet in diameter by 11 feet 9 inches long, with a working pressure of 130 pounds, and is fitted with three corrugated furnaces of 36 inches diameter.

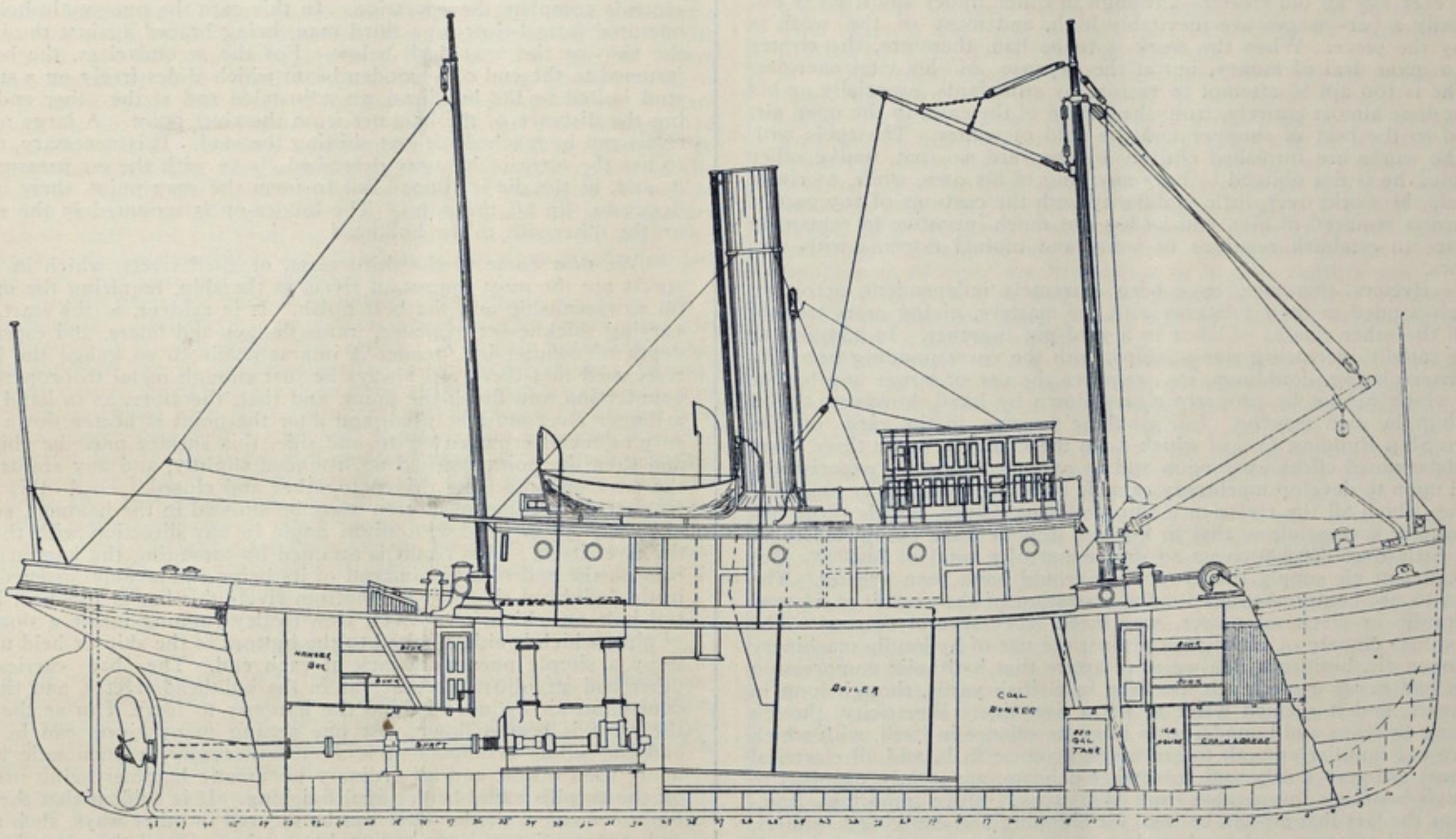
Eureka Transit Co. is the name of the corporation organized to own and operate the Welland canal size steel steamer building at the works of the Cleveland Ship Building Co., Lorain, for W. A. Hawgood and others of Cleveland.

BABCOCK & WILCOX BOILERS FOR BRITISH SHIPS.

Reports from England are to the effect that recent trials of H. M. S. Sheldrake were successful in so high a degree as to augur well for the further adoption of the Babcock & Wilcox water tube boiler in large vessels of the British navy. The Sheldrake was fitted some time ago with four Babcock & Wilcox boilers, each of 1,000 horse power. The trials, extending over several weeks, were each of 1,000 miles continuous steaming using only three-quarters of the vessel's boiler power, and the horse power varying from 1,500 to 2,100. The object of the trials was to afford the admiralty a basis for comparison with those carried out on the Sharpshooter, which was fitted with Belleville boilers in 1895, with a view to determining the relative merits of the two types of boilers as coal economizers and their suitability for the naval service generally.

Full reports from the trials of the Sheldrake are not yet available, but those at hand are certainly decidedly favorable to the American type of boiler. On the first trial an average of 1,500 horse power was registered, the boilers used having a collective heating surface of 7,063 square feet and a grate area of 189 square feet. The coal consumption was found to be 12.3 pounds per square foot of grate per hour and 1.61 pounds per indicated horse power per hour. Something over 71 tons of coal was consumed during the run. On the second trial, with the same heating surface and grate area, the power developed was 1,500; coal consumption averaged 12.67 pounds per square foot of grate surface per hour, or 1.6 pounds per horse power per hour. It is noted that in both trials the efficiency of the boilers was greater at the end of the run than at the beginning, and apparently they could have continued steaming as long as the coal lasted with efficiency fully maintained.

A recently completed installation of Babcock & Wilcox boilers is that in the immense dredge built for the Russian government by Cockerill & Co. of Hoboken, Belgium. The craft has two entire half hulls, each fitted with four Babcock & Wilcox boilers, to be fired with petroleum fuel only. Trials of these boilers also proved entirely satisfactory. Among the other orders booked abroad by the Babcock & Wilcox people within the past few weeks are for boilers for the steamer Sirdar, building for the London and India docks joint committee, and for a combined yacht and tug building by Edwards & Co., Millwall.



TUGS FEARLESS AND WALLULA, BUILT BY THE UNION IRON WORKS, SAN FRANCISCO.

PUBLIC WORKS CONTRACTS.

Major T. W. Symons, United States Engineer at Buffalo, will receive until 11 A. M., May 10, sealed proposals for the construction of concrete superstructure for the Buffalo breakwater. Communications relative to the contract may be addressed to the office of the United States engineer, Morgan building.

Proposals for the dredging of Cleveland harbor will be received until 2 P. M., April 26 at the office of Jared A. Smith, colonel of United States engineers, 185 Euclid Avenue, Cleveland.

At the United States engineer office, 1637 Indiana avenue, Chicago, bids will be received until noon on May 9 for constructing 13 miles more or less of feeder of the Illinois and Mississippi canal, from mile 17 to mile 29, south of Tampico, Ill. Information may be secured from W. L. Marshall, major of engineers at the above address, or of Assistant Engineer L. L. Wheeler, Sterling, Ill.

Capt. J. G. Warren, corps of engineers, at Milwaukee, has asked proposals for buying a tug to tend dredges on harbors west shore of Lake Michigan. The notice says that information will be given by Capt. Warren, Major W. L. Marshall of Chicago, Major C. B. Sears of Duluth, Colonel J. A. Smith of Cleveland, Lieut. Colonel G. J. Lydecker of Detroit, or Major T. W. Symons of Buffalo.

NORTHWESTERN GRAIN MATTERS.

Duluth, April 12.—One of the leading vessel agencies sends out the following review of the freight situation:

"The week opens with the wheat shippers still out of the market. There is no inquiry for this cereal in New York, due primarily to an indifferent foreign demand, and also because the character of the lake bill of lading is not yet established. Grain shippers here affect to believe the strike of ore miners will have a depressing influence on lake freights, but with anything like a brisk demand for tonnage, there should be an improvement in grain rates from this port; and now it is announced anyhow that the strike is off with little probability of further trouble during the season. It is claimed from Minneapolis that grain is being worked east from that city all rail at a cheaper rate than can be obtained via Duluth with a 2¾-cent wheat rate. We understand that something like 500,000 bushels were contracted last week, all rail. Coal receivers are certainly very anxious for the opening of navigation. All the docks seem to be pretty well cleaned up. Warm weather has prevailed for about a week and clear water is beginning to appear in the harbor basin. The great sheet of ice outside the harbor is honeycombed."

General Passenger Agent W. F. Herman of the Cleveland and Buffalo Transit Co., who has long been famous among railroad and steamship agents for the novelty and artistic excellence of his circulars and announcements of various kinds, has outdone former efforts in a neat little folder announcing a reduction in berth and stateroom rates between Cleveland and Buffalo. According to the new schedule, which will go into operation with the opening of the season, prices will be as follows: Outside rooms, $2; inside rooms, $1.75; parlors, $2.50 to $5; parlors with bath, $6; upper berths, 75 cents; lower berths, $1 to $1.25. The range of price varies according to location. During the season soon to open the company's steamers City of Erie and City of Buffalo, which are characterized in the circular "the fastest, staunchest and throughout the best of any plying the waters of the great lakess," will leave Cleveland every evening at 8 P. M., central standard time, and Buffalo at 9 P. M., eastern standard time, making the run of 183 miles in ten hours.

The meeting of the National Board of Steam Navigation at New Orleans last week was declared by the large number of members in attendance to be one of the most instructive yet held. Resolutions were passed asking the government to take action with regard to certain needed river and harbor improvements and aids to navigation. Supervising Inspector-General Dumont of the steamboat inspection service and other government officials were in attendance.

The launch of the Henry W. Oliver, steel steamer building for the Wilson Transit Co. of Cleveland, has been set for 3 o'clock this (Thursday) afternoon at the yard of the Cleveland Ship Building Co. at Lorain. The Oliver is 444 feet in length, 50 feet beam and 29 feet deep, somewhat smaller dimensions than the Bessemer steamer Samuel S. B. Morse, but she is expected to break all lake cargo carrying records nevertheless. It is anticipated that she will carry 7,000 gross tons.

PNEUMATIC RIVETERS.

MEMBERS OF THE INSTITUTION OF NAVAL ARCHITECTS (BRITISH) ARE INFORMED OF THE VARIOUS WAYS WHICH THE PORTABLE AIR MACHINES ARE APPLIED IN SHIP YARDS OF AMERICA—A FULL DESCRIPTION OF TOOLS AT THE WORKS OF THE CHICAGO SHIP BUILDING CO.

BY W. I. BABCOCK OF CHICAGO.*

Probably the hardest manual labor in all the various operations in building a ship is that of riveting. Combined with this is an amount of technical skill acquired only by long and arduous apprenticeship at the trade, and varying with the class of rivets driven. Like the stonecutter who can only learn to do first-class work on one particular stone, and is at a loss, for instance, on marble, if trained to granite, so a first-class shell riveter cannot properly drive inside rivets and vice versa; while the boiler riveter, however good he may be at his own work, is of little use on any part of the ship's hull. With such conditions, a difficult trade to learn, a hard and exhausting one to follow, wearing a man out in his youth, for no one ever saw an old riveter—although in other trades age itself is not necessarily a bar—wages are inevitably high, and most of the work is done by the piece. When the work is to be had, therefore, the riveter makes a great deal of money, but at the expense of his vital energies, which he is too apt to attempt to restore by stimulants, especially as his work is done almost entirely, from the nature of the case, in the open air, exposed to the heat of summer and the cold of winter. The tools with which he works are furnished entirely by the yard, so that, unlike other mechanics, he is not obliged to have anything of his own, while, as rivets are rivets the world over, little familiarity with the customs of any particular yard is required of him, and he has not much incentive to remain in one place to establish relations of amity and mutual esteem with his superiors.

The riveters, therefore, have been extremely independent, arrogant, and high-handed in their relations with the masters, giving more trouble than all the other classes of labor in a yard put together. In addition to this the rapidly increasing size of ships, with the corresponding necessity for heavier plating, doublings, etc., requires the use of larger and longer rivets, which cannot be properly closed down by hand, however, skilful or willing the men may be. For all these reasons, in the yard of the Chicago Ship Building Co., of which I am the manager, some three years ago a determined effort was begun and an extended series of experiments entered upon to develop machinery capable of being operated by unskilled labor, by which all the rivets in a ship could be driven, which effort has been entirely successful, so that in the last ship we have completed there were a little over 250,000 rivets so driven out of a total of 340,000. But for insufficient air supply the proportion would have been greater. The decision to use compressed air for the operation of the machines, instead of hydraulic or electrical power, was made for several reasons. The severe winter climate of Chicago is against the use of hydraulic machinery in the open air, besides which we were aware that hydraulic compression riveters had never made much headway in British yards, though long in the market, and it seemed wiser to try a new line. Electricity, though advancing by leaps and bounds, is an intricate science in itself, with which we were not familiar enough to see much promise in it, and all electrical appliances are very costly and somewhat delicate, apparently unsuited to the rough handling inseparable from ship work. More important, however, was the fact that air can be used for chipping and caulking hammers, for drills and reamers, and for hoists, as well as for ventilating and cooling confined places, so that a compressing plant is a necessity in any event, while we, of course, knew that pneumatic compression riveters are universally used and indispensable in American bridge shops.

We had in use already at that time a stationary steam riveter of the ordinary type driving rivets in such portions of the ship as could be assembled and handled as a whole. 1,800 rivets is an ordinary day's work of ten hours on this machine, at a cost of one-half cent apiece. A very short experience with compression riveters showed that their great weight —reaching over 2,500 pounds for 6 feet gap—interfered too much with facility of handling to make them either useful or economical. We then turned our attention to the pneumatic hammer, consisting of a cylinder in which a piston reciprocates, delivering an almost continuous series of blows against the end of the chisel, caulking tool, or rivet die. The hammer is light, powerful, short enough to go between frames, and small enough in diameter to get at rivets in corner angle. For small rivets it can be held in the hand, though the work is severe. It is, however, almost impossible to hold on to the rivet by hand, the heavy holding-on hammer being fairly jarred off the head of the rivet by the rapidity of the blows from the pneumatic hammer, giving the holder-on no opportunity to bring his tool back into position between blows as in hand riveting. We quickly devised a simple pneumatic holder-on, however, which admirably serves the purpose, consisting only of a cylinder carrying a piston, behind which air is admitted, the rod extending through the front head and being cupped out to go over the head of the rivet. A piece of pipe secured to the cylinder braces it against any convenient support. Combining these two machines with a yoke, the hammer being mounted on one arm and the holder-on on the other, makes a self contained machine in which the yoke itself can be made very light, as it has to resist only the pressure of the air against the end of the holder-on cylinder and the reaction of the hammer blows.

Various sizes of these yoke riveters are used, and the weights are as follows for the depth of gap given, the yoke being made of pipe for the larger sizes: 9 inch, 83 pounds; 51½ inch, 160 pounds; 70 inch, 220 pounds. It is very evident, therefore, that these riveters are portable in the highest degree. In fact, in the greater number of places they are moved about by two men entirely by hand, the cross bar in the throat of those of larger gap forming a slide, and assisting in the movement. Occasionally they are suspended on a trolley from a light framework of pipe. A variation of the device is to mount the hammer in a cylinder as a piston, behind which air is admitted to force the hammer forward as the rivet point is beaten down, the die on the opposite arm of the yoke being then solid, and may be small to get into contracted spaces. For driving the rivets connecting frames and brackets at the tank top of a double-bottom ship the yoke is mounted on a pair of rough wooden wheels for ease in handling.

The above descriptions will, I trust, sufficiently make plain our methods for all rivets which can be reached on both sides by a yoke or gap riveter. There remain three classes of rivets in a ship, as follows: (1) Those through decks and tank tops, mostly countersunk, and all driven vertically downwards from above; (2) bulkhead rivets—other than those near the top, or adjoining openings, which can be reached by a yoke—nearly all with full heads; (3) those in the outside shell of the ship, all countersunk. These three classes must be reached by riveters on one side and holders-on on the other, without any connection whatever between them. The first class are most easily driven, and for them the hammer is mounted on a bent pipe, with a pair of wheels at the bend. The operator raises a handle to bring the flat die on to the rivet, and, the bend of the pipe being loaded with lead, has only to bear down upon it in driving. A second man, with a pneumatic chipping hammer, cuts off the surplus metal, and, the riveting hammer being brought back, a few seconds complete the operation. In this case the pneumatic holder-on is operated from below by a third man, being braced against the bottom of the ship or the next deck below. For the second class, the hammer is fastened to the end of a wooden beam which slides freely on a supporting stud bolted to the bulkhead, an adjustable rod at the other end governing the distance of the hammer from the rivet point. A large number of rivets can be reached without shifting the stud. It is necessary, of course, to use the form of hammer described above with the air pressure behind it, and, as the die is cupped out to form the snap point, there is no tendency to slip off the point. The holder-on is mounted in the same way on the other side of the bulkhead.

We now come to the third class, or shell rivets, which in many respects are the most important rivets in the ship, requiring the most careful workmanship and the best finish. It is evident, at the start, that the varying thicknesses of plates, frame flanges and liners, and especially the depth of countersink, render it impracticable to so gauge the length of rivet used that there will always be just enough metal to properly fill the countersink and finish the point, and that, therefore, as in hand riveting, a longer rivet must be used, and after the point is beaten down with the surplus metal crowded off to one side, this surface must be chipped off, and then the point finished up, rounded slightly, and any seams between the rivet and the plate driven together and closed. To do this a certain amount of freedom of motion must be allowed in the hammer, so that its axis may be inclined at a slight angle in any direction with the axis of the rivet itself. This result is attained by mounting the hammer in gimbals on the end of a bar instead of its being immovably fastened to it, as in the bulkhead riveter. For bottom rivets this bar is attached, by a central bolt on which it revolves, to a trolley running inside a slotted piece of pipe, which is either bolted to the bottom of the ship or held up against it by a simple pneumatic jack at each end. The bar carries at its other end an adjustable brace as in the bulkhead riveter, and there is, of course, an air cylinder behind the hammer to force it in as the point of the rivet is beaten down. At one setting many rivets can be reached, and the whole arrangement is very satisfactory, a pneumatic holder-on being used inside, and an ordinary pneumatic hammer being used to cut off the surplus metal before final finishing. It is evident that the freedom of movement of the hammer can be secured in other ways, such as a ball-and-socket joint of large radius, but we have found the gimbal mounting more satisfactory, and all that can be desired. While the same arrangement can be used for the side of the ship, it is not very satisfactory there, and a different one is desirable. In this the bar carrying the hammer is vertical, and is fastened to a bored-out tee, sliding freely on a horizontal pipe. This pipe is prevented from moving away from the ship by vertical pieces of bar or angle iron at each end, bolted to the ship parallel to the side and 8 inches or 10 inches away from it. The pipe is hung from pulleys above, and counterweighted so that it moves freely up or down. By the vertical movement of this pipe and the horizontal movement of the sliding tee any rivet can be reached from the gunwale of the lower turn of the bilge, and for a length of about 10 feet, without shifting the rig. Inside the ship a couple of rough wood stanchions are bolted or wedged in position for guides, and a counterweighted piece of 2 inch plank moves against them in unison with the riveter and forms the brace for the pneumatic holder-on, which is easily moved by hand into proper position.

The quality of the work done by all these machines, both inside and shell is first-class in every respect, and far superior to hand work, and such is the unanimous opinion of the inspectors who have been and are on duty in our yard. That this is natural appears from several considerations. The rivets are closed down more rapidly and at a much higher temperature, and, as it is always easy to bring the axis of the hammer in line with the axis of the rivet, and, in fact, natural for the men to so bring it, the rivet is plugged at once by the first blows of the hammer, thoroughly filling the hole throughout, before the point begins to form. The tendency of hand riveters to save labor by forming the point without thorough plugging, leaving a rivet which, though looking all right and passing the tester, is liable to loosen afterwards in service from the constant jar and vibration of the hull, is, therefore, avoided. In many confined places, also, where only one man can strike, and the space for the swing of the hammer is limited to the frame spacing or less, hand rivets are very apt to be poorly driven, but it is evident that such considerations do not affect the machine, and that, if the pneumatic hammer can get to the rivet at all, it is as well put in as in the most open parts of the work. As to the cost of the work, I submit the following figures, from the last ship completed in our yard:—

*Read at the fortieth session of the Institution of Naval Architects, London

INSIDE RIVETS, ALL ¾-INCH.

Hand, piecework	25,073	Average cost	3·16	cents.
Hand, day work	9,255	" "	8·57	"
Air	151,167	" "	2·06	"
Steam	23,544	" "	0·51	"

SHELL RIVETS, ⅞-INCH AND 1-INCH.

Hand, piecework	51,306	Average cost	3·99	cents.
Hand, day work	4,314	" "	7·69	"
Air	74,493	" "	2·96	"

The amount that should be added to the machine cost to cover interest, maintenance of plant, and operation of compressor, is undoubtedly much greater than the corresponding amount for hand riveting, which is little beyond hammer heads and handles; but I cannot give it exactly, as we were using much air at the same time for drilling, reaming and caulking, as well as for blowing the rivet-heating forges—so much so, in fact, that we exceeded the capacity of the two compressors in use, and not only had to stop putting on more machines and go back to hand riveting, but, for a large portion of the time could not maintain more than 70 pounds pressure in the air mains, which seriously impaired the efficiency of the hammers. We had an air capacity of about 850 cubic feet of free air per minute at 100 pounds pressure, but we have now nearly completed a new compressor of 3,000 feet capacity, to work at 125 pounds pressure, and anticipate much better results hereafter. It is only fair to call attention to the fact that most lake freight vessels, like the one referred to above, are of very full model, with a large number of frames exactly alike amidships, and that they are launched broadside on, and therefore stand level on the stocks, both of which conditions are favorable to the use of these machines, especially of the shell riveters. Against this, however, it is equally proper to state that much of the development of the inside riveters took place on the boat referred to above, and that the shell riveters had never been tried at all until they commenced on her bottom plating. In the latter case, therefore, all the experimenting and working out of the appliances for rapidly and economically handling the machines, as well as breaking in the men to use them, came on that boat, and the cost appears in the above statement. It must be remembered also that the men who have worked all these machines are not riveters, nor even mechanics, but only laborers, and were not on piecework.

The largest rivets we have as yet driven with these machines are 1 inch in diameter. But there is no reason whatever why larger sizes can not be driven with equally satisfactory results. It is only necessary to use a larger hammer, one of greater diameter and longer stroke. In gasometer work in America this has been done already with gap riveters and 1¼ inch rivets closed with perfect success, and there can be no question but that a larger size shell riveter will handle rivets of equal diameter with the same facility, the somewhat greater weight of the machine being no disadvantage, as it is counterbalanced and does not come upon the operator at all. In Chicago we are still experimenting with and developing these tools, and hope to much further increase their efficiency and economy. I have thought, however, that the members of the institution might be glad to know of the results already accomplished in a matter of such importance to ship building.

TRADE NOTES.

On the recent governmental trial of the torpedo boat Python, the last of four torpedo boats built by Yarrow & Co. of England for the Austro-Hungarian government, the vessel, fully equipped under service conditions, attained a speed of 24.34 knots, the revolutions numbering 350 and the steam pressure 170 pounds.

An extensive addition was made recently to the East Boston works of the Boston & Lockport Block Co., and new machinery also installed. This company, one of the oldest of its kind in the country, reports a large increase in sales of their higher grades of blocks, especially their new style of hoisters with metaline bushed sheaves and lignumvitae cheeks.

The Brown Hoisting & Conveying Machine Co. of Cleveland has secured a contract for the two ore handling plants which the Hocking Valley railroad will install on its Toledo docks. One machine will be erected in May and the other in June, and it is claimed that they will be the most complete on the great lakes.

The Penn Steel Casting Co., Chester, Pa., recently cast a large rudder for the American line steamer Rhynland, now undergoing repairs at the Cramp ship yard. The rudder, which was cast in a solid piece, weighs over 13,000 pounds, and the stern post, which was made at the same time, weighs 9,000 pounds. The Chester concern is also making heavy shipments of rudders to Europe.

The Crumlish Forge Co. of Buffalo has recently received orders and most hearty endorsements of their forges from Arthur Sewall & Co. of Bath, Me., the Cleveland Ship Building Co. of Cleveland, the Gas Engine & Power Co. and Chas. L. Seabury & Co. of New York City, the Union Dry Dock Co. of Buffalo, the Globe Iron Works Co. of Cleveland and the Harlan & Hollingsworth Co. of Wilmington, Del.

The S. Freeman & Sons Manufacturing Co. of Racine, Wis., is completing a 1,200 horse power boiler to be placed in the Columbia River & Puget Sound Navigation Co.'s steamer Flyer. The boiler, which weighs 80,000 pounds and is to cost $8,000, will have 560 tubes and 2,700 staybolts. The shell is 9 feet in diameter by 13 feet in length and the firebox is 12 feet long, 10 feet wide and 8 feet deep. The working pressure will be 180 pounds.

The Lidgerwood Manufacturing Co. of Brooklyn, N. Y., has just received an order for a hoisting plant for handling coal near Christiana, Norway. Notwithstanding the long distance to that country the order will be completed and the plant installed in Norway inside of a month from date of the contract, a time in which the Norwegian manufacturers could not execute it. This rapid completion is accomplished by the special facilities the company employs through a system of duplicate parts, by means of which a complete hoisting outfit can be fully erected and thoroughly tested within the short space of forty-eight hours. This firm has over 13,500 engines in use all over the world.

JAPAN VERSUS UNITED STATES.

AN INTERESTING COMPARISON OF THE NAVAL INCREASE AND PRESENT NAVAL STRENGTH OF THE TWO NATIONS—NEEDS OF THE UNITED STATES NAVY.

In the course of a paper on "The United States Navy," recently read before the Civil Engineers' Club of Cleveland, the author, William B. Cowles, U. S. N., submitted a very interesting comparison of the growth of the navies of Japan and the United States during the past few years. The comparison is as follows:

	United States.		Japan.	
	No.	Displacement. Tons.	No.	Displacement. Tons.
Sea place in 1896	6	.....	8	.....
Available Navy, Jan. 1, 1899	50	185,381	26	92,362
Building and projected, 1899	27	210,025	13	1.3,156
Sea place with last additions	5	.....	7	.....

"In addition to the figures above given," said Mr. Cowles, "the United States navy had, on July 1, 1898, forty-seven auxiliaries, with a displacement of about 255,000 tons. When our present program becomes effective we shall be a good fifth, and about equal to Germany if we then have a commensurate merchant marine to draw auxiliaries from. Our sea place should be at least fourth if not third, and coming events, now casting their shadows before, will probably force us to take that place from business and trade necessity, no matter how we ultimately decide as to what has lately been called 'imperialism.'

"Our recent disagreement with a sixth-rate foreign power has shown some lines of needed improvement in our naval material. Water tube boilers are here to stay; there will be a minimum use of wood, and that used will be non-inflammable; cruising ships will be wood-sheathed and coppered; 'nurse ships' will be a regular part of every future squadron or fleet; to repair, to coal and water, to receive the sick and wounded and for many other like purposes. The little torpedo boat will cut less of a figure; large destroyers, with sustainable capacity for scouting and dispatch service, will be more in favor. Smokeless powder is a necessity. Application of rapid fire breechings to heavier calibers and an increased muzzle velocity will be sought and gained in ordnance. Higher squadron speeds and manœuvering powers will be sought, resulting in more uniformity in fighting ships.

"The growth of sea power among leading nations throughout the world is the most momentous fact of current history, and the logic of events has now forced a strong naval and merchant marine policy upon our country. If we would hold our own and take our destiny in hand, we must have a navy and a merchant marine commensurate with our commerce and our geography. Every ship bearing our flag abroad is a knight-errant of civilization and a missionary of trade; but she is far more even than this,—she floats a living element of our defense and of our power to deal justly among nations. The merchants of England certainly understand some of the axioms of foreign trade. There is one thing at least which we can safely learn from the business men of England without waiting to have it hammered into us by hard knocks in the new field of foreign relations and commerce upon which we are now entering. Anything which tends to the efficient maintenance or betterment of the royal navy and British merchant marine commands the lively interest of merchants, manufacturers and engineers throughout that empire; and this with them is a matter of business as well as of patriotism, for it concerns them vitally in their colonial and foreign trade, and, in its reflex action, their domestic affairs. The royal navy always stands first and foremost in the care of the British nation, and this for the very substantial reasons just stated. Some such thought and interest must be given our own little navy and merchant marine, if we are to attain and hold our natural and fitting position in international commerce."

PLANT LINE IMPROVEMENTS.

Extensive improvements are being made to vessels of the Plant line. The steamer Mascotte recently left Cramps' yard at Philadelphia for Port Tampa, after being repaired to an extent that amounts to practical rebuilding. La Grande Duchesse is also expected at the Cramp yard to be made ready for sea. Work is also to be pushed as rapidly as possible on the new steamer which the Philadelphia firm is to build for the line. In all probability the steamer Halifax of the C. A. & P. line out of Boston will also be laid up for a week's overhauling, something that is deemed advisable in view of the very heavy tourist business out of Boston for the Canadian provinces, which is certain to be developed during the coming summer. The steamer Olivette is plying regularly between Port Tampa, Key West and Havana, as are also the chartered steamers Yarmouth and Whitney, while the Mascotte goes to take up the same service. Large numbers of the United States troops are now moving from Cuba on account of the approach of the quarantine season. The schooner yacht Ingomar, with Vice President Morton Plant and party aboard, left Port Tampa April 4 and is expected to arrive at Boston on the 18th inst.

The navy department is making purchases of considerable machinery for installation in the temporary machine shop to be built at the Brooklyn navy yard. Heavy purchases have already been made from Manning, Maxwell & Moore and the Niles Tool Works Co. The permanent shop is expected to represent an expenditure of $1,000,000 when completed. Of this $300,000 will be expended on the building and the balance on machinery.

The Neptune Co., a Swedish wrecking corporation, has notified Acting Secretary Allen of the navy department that it does not deem it worth while to attempt to raise the sunken vessels of Cervera's fleet at Santiago. It is stated that it is feasible to float the Vizcaya, but that she would not be worth enough to warrant the necessary expenditure, while the wrecking of the Colon would not be undertaken unless the United States government would guarantee expenses in event of failure.

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President McKinley's order that all registry fees for documenting foreign vessels in Cuba be abolished seems to meet with general approval. The Cubans will thus be enabled not only to purchase vessels wherever they may desire, but an impetus will be given to the carrying trade of the island, which was virtualy stifled during the period of Spanish rule by the onerous tax imposed. The ultimate effect of this liberality of action will be to induce in time the establishment of ship yards in Cuba, but in the meantime doubtless many orders for vessels will be given to American and English builders. In marked contrast to the benefits to be derived in the case of Cuba is the embarrassment likely to result by reason of the failure of the last congress to pass a bill restricting trade between the United States and Hawaii to American bottoms. This would seem to add one more to the already long list of the inexcusable blunders of the recent congress with regard to shipping matters, and it is all the more regretable by reason of the fact that the bill passed the house by a unanimous vote and was reported favorably by the senate committee, only to fall a victim to the individual objections of one or two senators. Senator Frye of Maine, ever the staunch champion of shipping and ship building interests, has again placed the representatives of these industries under obligations by his energetic work, the disinterested sincerity of which suffers no detraction from the fact that it was not successful. Under the system of free register, which unfortunately still prevails, it is known positively that ship owners of several nations, notably Japan, England and Germany, are making plans to secure registry under the Hawaiian flag, although that emblem really no longer exists in law. These foreign competitors maintain that once having obtained this register the United States government can not consistently deprive them of what they can maintain are their rights under the Hawaiian laws. About 90 per cent of the commerce between this country and the Hawaiian islands is now carried on in American bottoms, but this supremacy can not of course be expected to continue many months under present conditions. Of course there is a chance that when congress does act it will fail to recognize as valid the position taken by the foreign vessel owners.

There is occasion for a commingling of satisfaction and regret in the announcement that the old plan of sending United States naval cadets to Europe for education as constructors will be resumed again this year. The whole subject has been considered during some months past from a number of different standpoints. A course in naval architecture was, it will be remembered, established at Annapolis two years ago by Naval Constructor Hobson, but the undertaking was not a success and it was then proposed to have a number of young men, chosen from each year's graduating class at the naval academy, sent to a private institution of learning in this country that makes a specialty of such a course. The plan, however, met with very vigorous opposition and was eventually abandoned. Now the failure of congress to appropriate the funds necessary to construct at Annapolis the building needed for the course has compelled its discontinuance there, and the whole subject is again receiving attention. The latest announcement is that it has been definitely decided to assign two of the cadets to Glasgow university and to send two others to Paris. There is no doubt that a good course in naval architecture, if not an absolute necessity, would at least prove a most valuable adjunct to the Annapolis institution, and with the ever increasing attention given to training in this branch by Great Britain and the more progressive foreign powers, our willingness to slight it must be regarded as in the nature of a serious reflection. In this case, as in several others with which everybody conversant with maritime or naval matters is familiar, the responsibility would seem to rest with the last congress, whose blunders in judgment regarding naval affairs does not seem to have been confined by any means to its ridiculous action with regard to the price of armor plate.

The growing regard in Great Britain for American ship building methods and machinery and the men who are responsible for them has not been better evidenced than by the prominence given to the papers read by representatives of the United States at the recent meeting of the Institute of Naval Architects in London. Three papers on distinctively American subjects is, it must be conceded, a decidedly liberal representation, and reports of the gathering are unanimous in indicating that in no other treatises presented was a deeper and more general interest manifested than in the papers of Engineer-in-Chief Melville of the United States navy, ex-Engineer-in-Chief Haswell and Mr. W. I. Babcock of the Chicago Ship Building Co.

Fredricka is the name selected for the Welland canal size steamer to be built at the Craig yard, Toledo, for the Porto Rico Steamship Co. of New York. This is the vessel that is to follow the one now on the stocks for Miller, Bull & Knowlton of New York. Both vessels will be managed by Miller, Bull & Knowlton. A second electric crane, 10-ton type, will be erected shortly at the Toledo yard.

The two large wooden schooners building at the ship yard of James Davidson, West Bay City, Mich., will probably not go into commission until about June 1. There is also building at the Davidson yard a large wooden tug for the Thompson Towing & Wrecking Co. of Port Huron.

THE NEW BOOKS.

The Arithmetic of the Steam Engine is the latest work of E. Sherman Gould, author of "A Primer of the Calculus." The object of the volume is to furnish a clear and concise digest of the fundamental principles of the steam engine, and the practical calculations based upon them. "While not entering into the more abstruse mathematics of the subject, it is believed," says the author in his preface, "that these few pages contain all that is necessary to solve the ordinary problems relating to steam in its applications to the steam engine." The preparation of the work is said to have grown out of the need for a collection of simple and accurate facts and rules, such as are embodied in few if any of the works of this class heretofore published. Any merit it may possess is found not so much in matters new as in the presentation of accepted facts of the subject in readily accessible shape for practical use.

Published by D. Van Nostrand Co., New York City.

Nevil Monroe Hopkins is the author of a very interesting work on "Model Engines and Small Boats," which has just come from the press and in which there are outlined new methods of engine and boiler making, with a chapter on elementary ship design and construction. While the author deals only with the direct-acting screw type of marine engine and gives direction for the making of shell and water-tube boilers only, it is claimed that the introduction of the system detailed in this volume for constructing small steam cylinders without patterns and castings, and boilers without the use of special tools, will enable a person with mechanical ability to apply the methods in a general manner, embracing almost any type of model engine and boiler. A chapter on elementary boat design is given, followed by a system of hull construction using wooden ribs in combination with cardboard plating, which has given entire satisfaction under trying circumstances.

Published by D. Van Nostrand Co., New York.

An exceedingly valuable contribution to the maritime literature of the period is the volume on "Tides and Kindred Phenomena in the Solar System," by George Howard Darwin, Plumian professor and fellow of Trinity College in the University of Cambridge, which has just been published in this country. The work comprises in substance the lectures delivered in 1897 at the Lowell Institute, Boston, Mass., by Mr. Darwin, and an idea of the character of the work may well be gained from a paragraph of the preface in which the author says: "A mathematical argument is, after all, only organized common sense, and it is well that men of science should not always expound their work to the few behind a veil of technical language, but should from time to time explain to a larger public the reasoning which lies behind their mathematical notation. To a man unversed in popular exposition it needs a great effort to shell away the apparatus of investigation and the technical mode of speech from the thing behind it." Heretofore most writings on the subject of tides have been comprised in the chance chapters which popular works on astronomy devote to the subject, but these works to the average student of the subject, even in a superficial way, seem inadequate inasmuch as none of them contain explanations of the practical methods of observing and predicting the tides, or give any details as to the degree of success attained by tidal predictions. The latter chapters of this new book are devoted to the consideration of several branches of speculative astronomy, with which the theory of the tides has an intimate relationship. Admittedly the problems involved in the origin and history of the solar and of other celestial systems have little bearing upon life on the earth, yet these questions can hardly fail to interest those whose minds are in any degree permeated by the scientific spirit, and for the gratification of such an interest no better medium than this new volume could possibly be imagined. The book is handsomely illustrated.

Published by Houghton, Miffiin & Co., Boston and New York.

BRITISH INSTITUTE OF NAVAL ARCHITECTS.

The fortieth session of the British institute of naval architects, held in London the latter part of last month, was exceptionally well attended. The annual report of the council showed that financially the institution was in a very satisfactory condition, despite the fact that receipts were less than in former years, owing to no summer meeting having been held in 1898, while disbursements were above the average, due to the publication of an extra volume of "The Transactions" last year. During the year sixty-four new members were elected, while the losses due to deaths and withdrawals amounted to forty, leaving a net gain of twenty-four. Among other actions taken was the provision of a new class of associate members, intermediate between full members and associates as at present constituted. The president, Lord Hopetoun, took occasion to remark in the course of his annual address that it was the abnormal demand for ship building material that accounted for those instances in which the tenders of firms in the United States for steel plates for British ships had been accepted. The papers read were well received and in almost every instance provoked lively discussion. The annual dinner of the institute proved quite as enjoyable as on former occasions. A summer meeting of the institute will be held at Newcastle-on-Tyne.

The many friends of Mr. J. W. Fitch, secretary of the Cleveland Ship Building Co., will be pleased to learn that he has made such rapid progress from the effects of injuries sustained in a street car accident some time ago as to be able to sit up. His physicians now express hope that if he continues to improve as rapidly as in the past he will be able within two or three weeks to be back at his desk.

Frank S. Masten has been admitted to the law firm of Goulder & Holding, Cleveland. The firm now is Goulder, Holding & Masten. Mr. Masten has been gradually relieving Mr. Goulder of a great deal of detail in the large admiralty practice of this well-known Cleveland office for two or three years past and he has made friends among vessel men in all parts of the lakes.

LIQUID FUEL.

A DISCUSSION OF THE ADVANTAGES TO BE DERIVED FROM THE USE OF THE FUEL ON TORPEDO BOATS, BATTLESHIPS AND CRUISERS—PLACES IN VESSELS WHERE THIS TYPE OF FUEL MAY BE CARRIED WITH ABSOLUTE SAFETY.

BY SIR MARCUS SAMUEL.*

The subject of liquid fuel, although now coming into great prominence in England, is by no means a novel one. Petroleum has been in use for this purpose, both in Russia and America, for very many years. Its advantages, compared with coal, are well known and appreciated, and the sole obstacle to its universal adoption has been that the supply has been insufficient hitherto to warrant arrangements being made, except in Russia itself, for its use. Prejudices have to be overcome, the means of using treasure has to be shown and proved, and in such an article as liquid fuel not only has transport got to be provided, but special arrangements for storage have to be made, and it was also obvious that, if practical success is to be obtained liquid fuel will have to be sold at a price which will enable it to compete with coal. Ab initio this should be easy, when the cost of labor in mining for coal is taken into account, together with its transport from the fields where it is found to a place of shipment, and also the great cost incurred in placing it on board and discharging it, and the space occupied by it in the hold of a ship (this being about 45 feet to a ton of 20 cwt.), and, little as this is known and realized, the danger of transport arising from the highly inflammable gases contained in eastern coals renders fires in holds and bunkers far more numerous than the public are at all aware of. It is, of course, impossible to transport oil in bulk in steamers built for ordinary merchandise. Special arrangements have to be made by which the cargo is broken up into sections fixed by the regulations of the Suez canal as not exceeding 400 tons in any one compartment. In the tank steamers coffer-dams are placed fore and aft for isolating the oil against danger from the boilers or furnaces, which in these ships are placed quite in the after part of the vessel—a practice which it is a great pity is not adopted in more steamers, because the risk of accident from the breakage of the shaft is almost nonexistent in this form of structure, the lead being a small one, and the shaft being under the constant observation of the engineers, since there is no tunnel at all. Under the regulations of the canal company, pumps are provided which are capable of a minimum discharge of 500 tons of oil per hour. To show the progress of the business, I may state that the first steamer employed in the business of transporting oil in bulk through the Suez canal was a vessel of 4,000 tons burden of oil, whilst the largest of those employed now carry 6,500 tons, and we have three steamers in course of construction to carry 9,000 tons of oil each or 3,000,000 gallons. The facilities for landing and handling oil necessarily differ very much at various ports. At Nagasaki, Japan, the steamer lies next to the wharf, whilst at Kobe, Japan, a pier had to be constructed, it being impossible for a steamer to get alongside. At the port of Madras a breakwater of almost a mile in length had to be constructed before water sufficiently deep to allow a steamer of the size employed in this trade to get near, could be found, and even then a contrivance had to be constructed to connect the discharging pipe of the steamer with the breakwater. In spite, however, of these drawbacks, it is found that a steamer can easily discharge into the tanks, placed at one mile distant from the ships, at the rate of fully 200 tons an hour. As an example of the progress of liberal ideas, I may mention the installation at Bombay, where permission to land the oil was only given some two years ago, and after experience had shown the immunity from danger attending the transport of oil in bulk. These tanks are placed almost in the middle of the shipping. Railway sidings have been taken right up to them, whence oil is pumped into the tank wagons for conveyance all over India.

An enormous future lies before this fuel, even if it only depended on its relative cost compared with coal; but when we come to the collateral advantages it enjoys, the benefit of using it, as compared with coal, are simply overwhelming. It is unfortunate that it should be so, but one cannot fail to recognize the fact that the calls for purposes of war must take priority to those of peace, and the first great advantage to vessels of war, especially to torpedo boats, in using liquid fuel, as compared with even the best coal, is the entire absence of smoke arising from its employment. When combustion is complete—and this is very important, engineers having not yet found out how to handle fuel, and complete combustion does not take place, and smoke is caused—not a trace of smoke issues from the funnel of a vessel using it. How important this is to torpedo boats, the least initiated can understand, but it is not less so to cruisers, or even to battleships, which, when using liquid fuel, could shadow an enemy's fleet without being detected. Under the system adopted in the Haliotis, steam is used to spray the oil, but this is certainly not the most economical method, and already a system has been found, invented by a Dutchman, called the Kloos system, which entirely dispenses with the use of steam. One main point of difference between the burning of coal and liquid fuel is that while coal remains quietly in its place until it is burnt, liquid fuel would offer too small a surface to the air when lying in a tank to burn with so much heat as is required. It has, therefore, to be sprayed out in small particles to augment its surface. If however, the oil is sprayed mechanically, the rush of cold air chills the spray, and many of the small drops reach the funnel before combustion has taken place, thus producing smoke and soot. By heating the air well above the burning temperature of the oil, before it reaches the spray, this is remedied, and combustion takes place freely. In the heated air system, the oil is forced at about 50 pounds pressure through a Körting's sprayer into the furnace. In this sprayer the current of oil has to pass a screw thread, which gives a rapid turning motion to it, so that the centrifugal force causes the liquid to fly out in dust. The air is brought by a guiding plate at the back of the furnace, returns along cast-iron ribbed plates which are heated by the flames above it, and meets rectangularly the current of fine sprayed-out oil, the air being heated to about 500° Fahr. As the hole in the sprayer through which the oil is injected is under a sixteenth of an inch in diameter, the liquid must be well filtered, and to assist the centrifugal force in spraying it out in fine particles, the oil is heated to about 220° Fahr.

The advantage of the use of liquid fuel in steamers are even more manifest than in its employment on land. None but those concerned in the actual management of steamers know what trouble and anxiety arises from the employment of what is known as the "black element," namely, the stokers. By the use of liquid fuel the services of these men are almost entirely dispensed with, because oil flows by gravitation from service tanks placed well above the boilers, direct to the furnaces. The expansion and contraction caused by the frequent opening of the furnace doors is entirely avoided, and the life of a boiler consequently greatly prolonged. No ashes are made, and the strain and distress to firemen of heaving these overboard before commencing their watch is entirely saved, and no grit (so deadly in its working to delicate parts of the engines) is created. I fear it is only a practical expert who will realize how much this means. To anyone who has seen the manner in which the large crew needed on a torpedo boat or destroyer are berthed, in consequence of having to stoke the enormous boilers used upon these craft, the fact that under the use of liquid fuel the crews of these vessels can be reduced to less than half of those now necesary is, in itself, an argument so overwhelming that, were this its only advantage, it would suffice to compel its introduction into this class of vessel by those in power; but when it is borne in mind that men in torpedo craft literally carry their lives in their hands, depending solely on the speed of the vessel, and not upon her armament, it is clear that a great step is attained when the crew carried upon these vessels is reduced. Oil can be carried in spaces which it is impossible to utilize in any other way, and especially in such craft as torpedo boats, where the form of the vessel under water renders the attaining of stability a difficult problem. Oil carried in the bottom of the steamer, below the water-line, would be impervious to shot, and, by the system of service tanks patented by Sir Fortescue Flannery as oil is pumped out of the ballast tanks of a steamer, water can readily be taken in to replace it, because if the mixture is put into a service tank, and allowed to settle, water is quickly precipitated to the bottom, and can be drawn off, the oil remaining being pumped pure into the second service tank, whence it flows to the bunkers, and it can readily be conceived how many spaces now lost in vessels can be utilized for the storage of oil, allowing a much greater weight for armament or quantity of cargo to be carried in space now used for bunker purposes only, or lost entirely through being too small or inaccessible for the storage of coal. The importance of the new departure has been promptly recognized by Lloyd's, which, I am glad to say, has issued regulations allowing liquid fuel, having a flash point of over 200° Fahr. to be carried in steamers' ballast tanks, and this will greatly facilitate its general use. The much longer time that a vessel equipped with liquid fuel can keep at sea is also a factor which must not be overlooked, and, provided relays of supplies are furnished at ports not too far apart, the carrying capacity of an ordinary merchantman is increased by some hundreds of tons, dependent necessarily on the size of the vessel, whilst the saving in time in taking in oil instead of coal as bunkers can be best estimated when I state that oil can easily be put on board at the rate of 300 tons per hour, and this without the slightest dirt—a great characteristic of the Borneo oil being, too, that it is almost odorless.

The experimental stage in the burning of liquid fuel, as stated at the commencement of this paper, has long since been passed. The uses for it in Russia itself are innumerable, and the latest statistics show that no less than 7,000,000 tons per annum are consumed in Russia for liquid fuel alone. Lately it has been largely adapted for naval purposes as well, whilst for many years the steamers navigating the Caspian sea have used it exclusively. There are no less than eight steamers at present engaged in the eastern trade which are fitted for it, and where the results attained have answered the expectations of their owners beyond their most sanguine anticipations, whilst large numbers of vessels are under construction expressly for the use of liquid fuel, and a great number of steamers hitherto burning coal are also being altered. In the far east tanks have been erected at ports ranging from Yokohama to Suez, including all the Indian ports, whilst cargoes of the Borneo oil have also been landed at the principal ports, and 4,000 tons is at the present time on passage to London. Under the advantages which I have enumerated it will be understood that it is rapidly going into general consumption. In Europe the Russian, the Italian and the German navies have partially adopted it.

*Read before the Society of Arts, of London, Eng.

Commander Hanford, U. S. N. inspector of the tenth light-house district, has recommended that gas buoys be placed on Galoo island shoal, Lake Ontario, on Kelley's island shoal, southwest of Kelley's island, Lake Erie, and on Peach Orchard point, entrance to Put-in-Bay, Lake Erie. It is probable that these buoys will also be in place shortly after the opening of navigation. Commander Kennedy of Detroit is preparing for further lighting of the Sault river with several additional gas buoys. The new channel above the locks will probably have three gas buoys in addition to range lights authorized for that place. A new gas lighted beacon will be provided for the turning point in Mud lighting. It is not expected, of course, that the new Sault river lights will be provided immediately upon the opening of navigation, but the work will be carried out as rapidly as possible.

The artistic folder issued by the Northern Steamship Co. of Buffalo and bearing the distinctive title "In All the World No Trip Like This" is again attracting favorable attention. The first sailing of the Northern Steamship Co.'s boats from Buffalo will be on Tuesday, June 13, and the first sailing eastbound from Duluth will be on Saturday, June 17.

THE NEW CUP DEFENDER.

Interest in the coming international yacht race gradually increases as additional details regarding the prospective contestants become available. In the course of an extended article on the American yacht, now building at the Herreshoff works, Bristol, R. I., the New York Sun says:

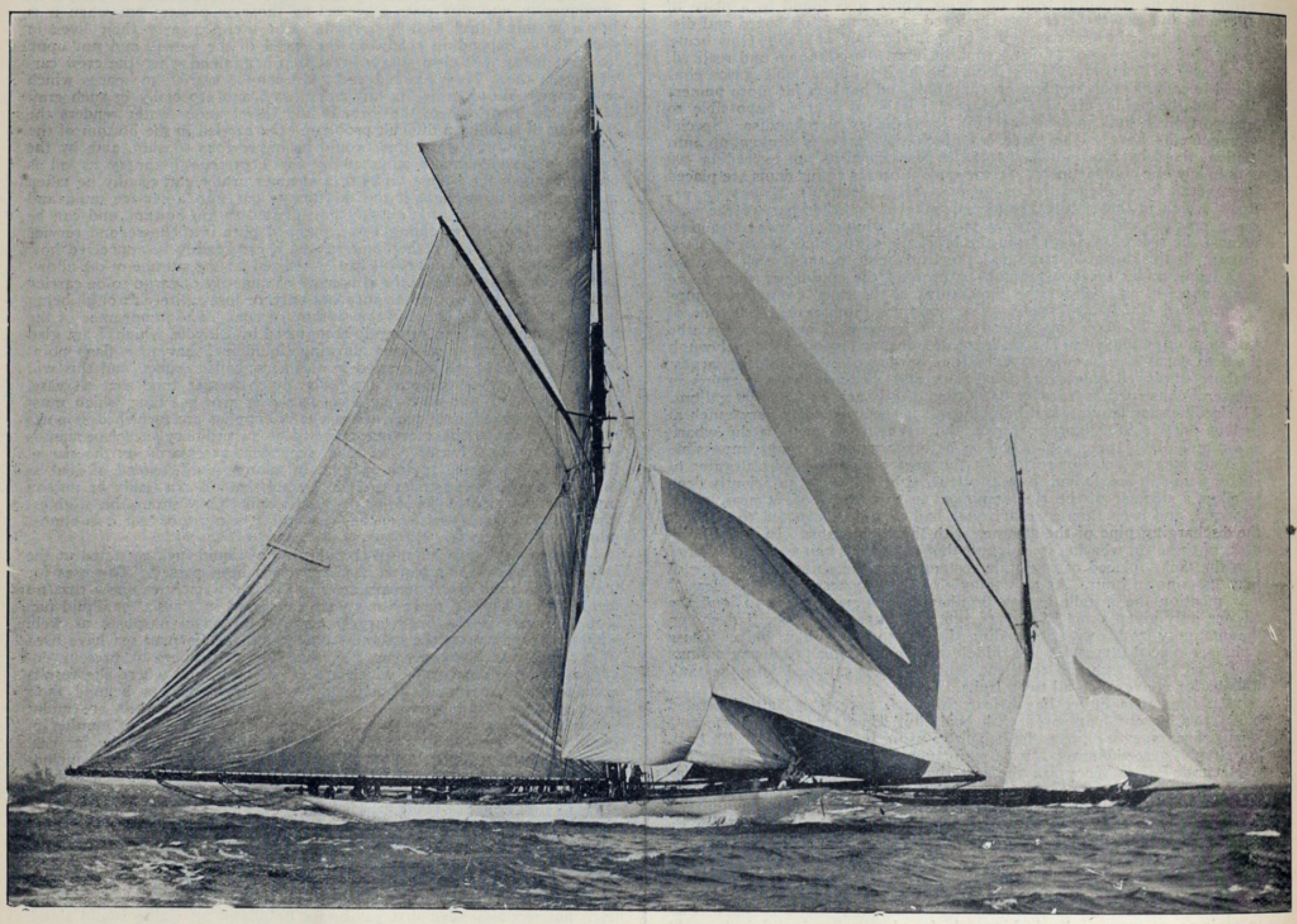
"The over-all length of the new boat will be 131 feet 4 inches, or 7 feet 4 inches longer than the champion of 1895. She will also have 11½ inches more beam, 1 foot greater draught, and nearly 2,000 more square feet of duck in her working sails. She will have a trifle more displacement than the old Defender. Her complete sail spread will not be far from 12,500 square feet. Tobin bronze and nickeled steel are the sole materials used in the construction of the hull of the new defender, the latter being used for the topsides, with the underbody of bronze. The experiment of the Defender has proved that aluminum is not the proper thing for topsides of a big sailing yacht. It is compelled to bear a great deal of strain and becomes corroded through the action of salt water and air. For this reason aluminum has been discarded in the construction of the new boat, and through the extra weight of the steel as compared to the lighter metal her hull will be somewhat heavier than that of the Defender. Tobin bronze, which will sheathe the underbody or wetted surface is the lightest and smoothest that the manufactureres have yet made, and it will be riveted to the frames in the same manner as on the older boat. The bronze will be put on in five strakes, seven-fortieths of an inch thick, and the steel topsides will be worked on in two strakes, each ¼ inch thick. She will not have as much freeboard as the Defender, but will have a crown to her deck of 10 inches.

"In building the new boat, Designer Herreshoff will not depart materially from that of the Defender. The frames in the waist are the same size, 3 by 2½ by ¼ inches, as used in the old champion, as are also those that are set up in the overhangs forward and aft, 2 by 1½ by 3-16 inches. There are thirty-four frames on the stem, eighteen on the lead keel, eight on the sternpost, which rakes at an angle of 42 degrees, and seventeen in the after overhang between the sleeve for the rudder post and the transom. The new yacht will also have two steel collision bulkheads, one at the forward end of the water line and the other just aft of the rudder post. The mast will be stepped 27 feet 6 inches aft of the face of the stem at the load water line, and the frame directly under it has been crowned so as to let the mast fit down in the bury, thus making the step additionally strong and rigid. A view of the midship section shows improvement over that of the Defender. The greater beam permits of a rounder turn to the bilge and the form is wider both at the deck and water line than that of the older craft and shows a marked tumble home. The shape possesses more natural stability, and, coupled with the lowering of the lead keel, explains how the designer worked to obtain greater power and ability to carry additional sail.

"The line of the deck shows a trifle less sheer than the Defender, and the lines of the entrance forward of the midship section are fuller, making an easier turn to the frames and a longer floor on which to sail when heeled to a breeze, and will have a tendency to sail over the water rather than drive through it. The lines of the run have been refined a trifle, but do not differ materially from those of the Defender. Nor is there any marked difference in the breadth of the lead keels of the two boats. The extreme width, where the lead met the underbody of the Defender, was 24 inches, which has been reduced to 21 inches in the new craft, and the bulb of both is about the same, nearly 3 feet. The new boat's lead casting is nearly 2 feet deeper than that of the old champion, and weighs in the vicinity of ninety-five tons, or about ten tons more than Defender's.

"In displacement Commodore Morgan's boat will be between six and seven tons heavier than the Defender, which, with the new design and various other improvements, will practically be that much weight as ballast. A new feature is a statement that the new defender will be equipped with a steel mast as well as other spars, and the Defender will also have a metal mast to replace the Oregon pine stick that she carried in the races of 1895. The mast for the new boat will be of thin plates of steel riveted to longitudinal braces on the inside and will show the same smooth, cylindrical surface as did the steel boom and gaff of the old Defender. It will be 21 inches in diameter at the deck, 16 feet long, and will be a great deal lighter and stronger than the wooden stick of the old yacht, which measured about 75 inches in circumference at the deck. As far as can be discovered, this will be the first steel mast ever used in a yacht on this side of the Atlantic, and it is an experiment that will be carefully watched by all naval architects. It is understood, however, that a complete set of wooden spars will be made in case of an emergency, but no break down is anticipated for the reason that steel spars have received a thorough test by vessels in the merchant marine, where structural weakness would be equally dangerous to life and property. The spars for the two yachts are being built at Bristol and will be braced with bulbed steel angles.

"A comparison between the known dimensions of the new defender and Sir Thomas Lipton's challenging yacht, Shamrock, shows that the American boat will be 3 feet 4 inches longer over all, with about the same water line, and 2 feet more beam than the cup hunter. Both will have bronze underbody plating, but the Royal Ulster Club's representative will have topsides of aluminum and a pine deck over a bronze sheathing."



THE OLD DEFENDER—WINNER OF THE LAST INTERNATIONAL RACE FOR THE AMERICA'S CUP.

CUMBERSOME AUXILIARIES.

THEIR ARRANGEMENT ABOARD WAR SHIPS IS A SOURCE OF GREAT COMPLICATION —MR. IRVING M. SCOTT ADVOCATES GREATER SIMPLICITY AND DIRECTNESS IN APPLYING POWER.

Mr. Irving M. Scott of the Union Iron Works, San Francisco, builders of the Oregon and other well-known vessels of the United States navy, says that more simplicity in the auxiliary machinery of our war ships is what is needed most just now. It only requires, he claims, that traditions of the service be laid aside and a new start made on common sense principles. Mr. Scott discusses this subject, as well as the boiler question in an article in the current number of the Engineering Magazine. He says:

"Since I have had to do with the getting out of machinery adapted to the navy and varied requirements of naval vessels, I have never missed an opportunity to advocate greater simplicity and directness in applying the power to the work to be done. Ship building and naval traditions are the strongest obstacles to be overcome in attempts to improve in the direction of simplicity. The war ship is a growth, and while new methods are invented for certain purposes and adopted, the old methods are still retained, until in some ships we find several ways of doing the same thing, all adding to the general complication. The firm with which I am connected is just finishing a war ship for the Japanese navy. It is lighted by electricity. The generators are in triplicate to insure against failure, and the wiring is divided into several circuits so that only a portion of the lights would be extinguished in case of failure in transmission. Yet, after all that care, oil lamps must be fitted wherever light is required, and lest there should be no oil in the lamps 300 candlesticks must be furnished.

"In the important matter of power transmission I do not know of a single ship in which one mode of transmission has been adopted throughout the ship. Steam pipes, water pipes and electric wires are still run side by side from end to end of the ship, where one would answer all purposes. While I have been a strong advocate of hydraulic power transmission on war ships, there are so many operations in which electric transmission seems to meet the conditions more directly that I now think we are fast reaching a stage of development in the application of this subtle agent, which will render it the best means by which to operate all mechanism requiring power on board war ships. The use of only one means of transmitting power on a given ship would be a great step in the direction of simplicity.

"In nature we find that living organisms, when they have no further use for an organ that played an important part in the life of their ancestors, have the means of suppressing, or blotting out, as it were, the useless organ. But ship builders carry along a lot of appendages hardly ever used at the present day. The old sailing ship of the line required an efficient system of hand, fire and and bilge pumps, so arranged that men could work at them. Now we have an elaborate system of steam pumps for drainage and fire purposes, and yet the old hand pumps are fitted with their long cranks and many valves and connections to manifolds, although never used except in tests of their condition. The whole drainage system on these ships has been a growth, and, in consequence, needs to be freed from the many appendages that have outlived their usefulness. I see no reason why a main drain should not be provided in the construction of the hull, by having two vertical keel plates instead of one, the space between being the main drain well, extending from end to end of the ship. All compartments would drain into this well through valves controlled from the deck, and the pumps would draw directly from it.

"Another complication is ventilation and heating. These matters, in the United States navy, are under separate bureaus, the ventilation coming under the head of construction, and the heating under that of engineering. The heating system is a source of great trouble. The large amount of piping and the many fittings render it very difficult to prevent leaks. Now, with artificial ventilation as carried out for all living spaces on war ships, it would be a very simple thing to have each ventilating fan or blower deliver through a heater box fitted with the proper amount of steam-pipe surface, thus heating the fresh air to be sent through the living spaces, instead of running the hot steam pipes all over the ship.

"Where new methods of operating are adopted, they should always be reliable enough to displace the old methods, instead of being added to them, as usual. I have never seen a telemeter, for instance, applied to operating the valve mechanism of a steering gear, that replaced the appliances already in use for the same purpose. In the engineering department the same duplication of methods for accomplishing a given purpose prevails. The only thing remaining for which but one method of operating is provided is that of turning the propeller, which has come to be apparently of less importance than the question of how to handle feed-water pumps, fire pumps, filters, heaters and the numerous accessories pertaining to what used to be considered secondary matters.

"If the whole auxiliary system were blotted out and a fresh start made with the simple purpose of meeting all requirements as simply and directly as possible, much of the present complication could be avoided. There should be a pumping compartment, with the most economical pumping plant in duplicate for feed-water, its function to be that of taking feed-water from the feed tank, and delivering it into a feed main at a pressure sufficiently above the boiler pressure to make the feed absolutely sure. A loaded valve on this pipe would return the surplus to the feed tank. The attendant would regulate the speed of this pumping engine by the flow from the surplus valve. A bilge and fire pumping engine in duplicate would also be in the same compartment. A set of low-pressure pumps would also be required for water service, sanitary service, and circulation in auxiliary condensers and distillers. Main bearings, guides, etc., that have closed water circulation for keeping the parts cool, should discharge into the sanitary tanks overboard. The present plan of having them open to the bilge involves much pumping. The great mass of pipes, valves, and manifolds, now fitted always in duplicate, and often in quadruplicate, is often more a source of danger than of safety. They are now made with a little margin of strength. A small amount of wear or corrosion puts them out of service, and usually the duplicate is in the same condition as the original. If 75 per cent. of the material now put in duplicate pipe systems were put in one substantial arrangement, there would be less liability to derangement, and only one-half the stuff to care for. I am satisfied that one-half the piping and valves could be removed from the engine and boiler compartments of our war ships, in accordance with a plan that would increase their efficiency, reliability, and safety. It only requires that the traditions of the service be laid aside, and a new start made on common-sense principles.

"In the change that is taking place in the type of boiler used on war ships the usual conservatism in regard to naval practice has been cast aside. Where it was hardly possible with the Scotch boiler for the engineer to obtain space enough to install the boilers so as to get the best results, the water tube boiler now demands practically the whole ship under the protective dek. The argument in favor of this type of boiler —that it is lighter than the Scotch for a given power (I refer to boilers of the Belleville type)—has been given up for another that may have more foundation in fact, namely: the possibility of making repairs without opening the decks of the vessels. It has been customary to install Scotch boilers in war ships without regard to convenience in the matter of repairs. I have seen air shafts built over fire rooms not large enough to permit the passage of a furnace, when an inch or two more would have made the removal of a furnace as easy as on a merchant vessel. The contention that Scotch boilers would not stand forced draft has been settled by the fact that a large proportion of merchant steamers now use forced draft constantly, making continuous records of more than 20 horse power per foot of grate, while in war ships such a record is about the best reached for a trial of a few hours.

"It is not yet time to claim that the water-tube boiler in any of the many forms now in use is the boiler for war ships of the future. The question of endurance under unfavorable conditions has yet to be decided, as also the question of fuel economy. As it stands today, the navy department of the United States is committed to a trial, on a grand scale, of the water-tube boiler on battle ships. This will have the effect of lengthening the ships, as a form of water tube boiler suited for sea service cannot be installed in the space that accommodates the Scotch boiler, while more room must be given to evaporators for the production of fresh water, and more again to storage of the water thus produced. Skill that may be acquired in the management of water tube boilers may reduce the work for evaporators, and thus save fuel used for that purpose. The small amount of water in the boilers to take up and give out heat as the fire temperature varies is the principal cause of difficulty—to be overcome only by the skill and vigilance of those in charge. That the water tube boiler has made little progress in the merchant service, where economy in fuel and in operating expenses is more closely watched than in the navy, need not be taken as an argument against its use in the navy, there being other factors than expense that may outweigh all economic considerations."

NOTES IN GENERAL.

The Cunard liner Canada on a recent trip from Boston to Liverpool made a run of 500 miles using only her port engine, the starboard engine having become disabled.

The International Navigation Co. has been notified that work has been commenced on the Clyde on the two freight and passenger steamers that are to be placed in service between New York and Antwerp.

American manufacturers of ship building tools have been advised by their foreign representatives that a new corporation known as the St. Petersburg Ship Building, Machinery & Mechanical Factories has been formed, for the purpose of building vessels of the largest dimensions.

The New England Ship Building Co. of Bath, Me., builders of the lost steamer Portland, take occasion to deny in a most vigorous and emphatic manner certain rumors to the effect that she was improperly built and that decayed timber was used in her construction.

Mr. John Platt of the firm of Thorpe, Platt & Co., New York, sailed March 25 on the steamer Umbria on a business trip to Europe, to be gone about two months. It is Mr. Platt's intention to investigate particularly matters connected with the use of the Thorneycroft boiler in large ships.

Torpedo boat destroyers and torpedo boats of the United States navy to be equipped throughout with Blake vertical "simplex" feed pumps, fire and bilge pumps are as follows: Destroyers Bainbridge, Barry, Chauncey, Dale, Decatur, Hopkins and Hull. Torpedo boats Nicholson, O'Brien, Shubrick, Stockton and Thornton; also the monitor Florida.

The Howard Transportation Co. of Duluth, Minn., has been awarded a verdict of $8,000 damages against the Ogdensburg & Thousand Islands Transportation Co., former owners of the steamer Bon Voyage. The contention made by the Howard company was that the Bon Voyage consumed more coal in attaining a certain speed than was stated by the Ogdensburg Co. when the vessel was sold.

Recently issued specifications for the new dry dock at the Mare island navy yard, Cal., contemplate a dock 750 feet in length over all, 80 feet in width on the floor, 141 feet 6 inches in width on the coping and 30 feet draught on the sill at mean high water. It is also proposed to have crib work at the entrance to the dock, that system being more substantial and less liable to change of form than the former system of piles, braces and sheathing which has been used. In the timber docks already built, a good deal of trouble has been experienced, especially with the dock at League island, in preventing the sides from working in. In some instances when a ship has been docked, it has been necessary to shore up the sides of the abutment.

APPOINTMENTS OF CAPTAINS AND ENGINEERS.

Wolvin, A. B., Duluth, Minn.: Steamers—W. H. Gilbert, Capt. R. J. Cowley, Engineer Fred D. Philip; Superior City, Capt. R. J. Lyons, Engineer Wm. Most; Crescent City, Capt. H. L. Mills, Engineer Geo. E. Lawrence; Queen City, Capt. George Bell, Engineer E. L. Stoddard; Zenith City, Capt. J. L. Weeks, Engineer G. W. Towne; Empire City, Capt. F. P. Houghton, Engineer Chas. R. Ogg; Pennsylvania, Capt. F. C. Rae, Engineer Andrew Haas.

Fitzgerald, W. E., Milwaukee, Wis.: Steamers—Omaha, Capt. David Wilson, Engineer Chas. Bendschneider; Topeka, Capt. Jno. Tower, Engineer L. T. Latcher; Denver, Capt. Peter Christensen, Engineer Jno. Smith; Pueblo, Capt. D. Stalker, Engineer Alex. Staley; J. W. Westcott, Capt. J. D. Wanwig, Engineer D. W. Chipman, Jr.; Hennepin, Capt. A. E. McGregor, Engineer C. E. Robinson; Alice Stafford, Capt. C. D. Ross, Engineer Geo. McLean.

Leathem & Smith Towing & Wrecking Co., Sturgeon Bay, Wis.: Steamers—J. L. Hurd, Capt. John Walker, Engineer Geo. Keister; I. N. Foster, Capt. Chas. Packard, Engineer James Curry; Pewaukee, Capt. Sam Christerforsen, Engineer Mark Holt; John Leathem, Capt. Henry Tufts, Engineer Ed. Webber; Geo. Nelson, Capt. James Tufts, Engineer Ashley Cofferine; Sidney Smith, Capt. Peat Batcheller, Engineer Chas. Van Drasek. Schooner—Evaline, Capt. John Campbell.

Elphicke, C. W., Chicago: Steamers—W. R. Linn, Capt. C. Z. Montague, Engineer M. Tower; Arthur Orr, Capt. John Massey, Engineer John T. Goulding; Geo. N. Orr, Capt. A. R. Robinson, Engineer Levi Walder. Barge—Carrington, Capt. Geo. N. Trottier, Engineer Walter Farr.

Crosthwaite, J. L., Buffalo: Steamers—Cormorant, Capt. John Milne, Engineer G. A. Rogers; St. Louis, Capt. Jas. Brines, Engineer D. Struble; Niagara, Capt. M. A. Budd, Engineer W. P. Boynton. Schooners—Alice B. Norris, Capt. ————; Champion, Capt. Wm. McCarter.

Niagara Navigation Co., John Foy, Manager, Toronto, Ont.: Steamers—Chicora, Capt. Robert Clapp, Engineer Harry Parker; Corona, Capt. W. H. Solmes, Engineer Wm. Walsh; Chippewa, Capt. Jno. McGiffin, Engineer R. McCaul; Ongiara, Capt. H. McIntyre, Engineer R. Carl.

Mack-Becker fleet, Cleveland: Steamers—Geo. W. Roby, Capt. Geo. W. Pierce, Engineer Wm. Young; P. P. Pratt, Capt. Wm. Smith, Engineer Aura Stuart; V. H. Ketchum, Capt. W. C. Butts, Engineer Geo. B. Milne. Schooner—Athens, Capt. Geo. Mackie.

Wallace, David, Lorain, O.: Steamers—Vega, Capt. Adolph Oldorff, Engineer Barnard Woods; Vulcan, Capt. J. N. Smith, Engineer John McMonigal; Robert Wallace, Capt. H. T. Archer, Engineer Chas. McPhale.

Berry, Wm., Port Stanley, Ont.: Schooner—Albatross, Capt. George Houston. Tugs—A. V. Crawford, Capt. Joseph Hough, Engineer Robert Wood; Snowstorm, Capt. Alex. Coates Brown, Engineer John Brown.

Pierce, Wm. E., West Bay City, Mich.: Steamer—Benton, Capt. Wm. E. Pierce, Engineer A. P. Hagadon. Schooners—Harvey Bissell, Capt. H. A. Pierce; Delaware, Capt. E. M. Warner.

Livingstone, Wm., Detroit, Mich.: Steamers—Thos. W. Palmer, Capt. George F. Stilphen, Engineer Wm. Meade; Livingstone, Capt. Wm. McAlpine, Engineer Alex. Morrison.

Eastman, C. E., Saginaw, Mich.: Steamer—Wilhelm, Capt. William Roach, Engineer ————. Schooners—Nirvana, Capt. John Hudson; Galatea, Capt. Alfred Germain.

Danaher, J., Ludington, Mich.: Steamers—Marion, Capt. John Cochrane, Engineer ————: W. J. Carter, Capt. Andrew Wanwig, Engineer ————.

Detroit, Grand Rapids & Western R. R., Grand Rapids, Mich.: Steamer—Muskegon, Capt. Geo. L. Thompson, Engineer ————.

Donaldson, C. H., Buffalo: Steamer—Robert Mills, Capt. Philip Broderick, Engineer Wm. Skelton.

Holland, Chas. D., Marine City, Mich.: Schooner—John M. Hutchinson, Capt. Henry R. Holland.

Johnson, H. J., Cleveland: Steamer—H. J. Johnson, Capt. Charles Miner, Engineer Bert Jerom.

SOME ITEMS OF INTEREST.

The steamer Florence B., used in the marine postal service at Detroit, has been thoroughly overhauled and her speed will be equal to all requirements, so that the efficiency of the service during the coming season will no doubt be greatly increased. When the boat was dry docked last fall she was found to be in poor condition. Charles F. Bielman, the holder of the contract for the transportation of the mail, declined, however, to make the extensive repairs that were required on the vessel unless he was awarded a contract for more than a single year. The result of negotiations in the matter was that Mr. Bielman was awarded a contract for four years and agreed to have the repairs made. These latter, now completed, involved practically a rebuilding of the hull, the equipment of the steamer with new boiler, a thorough overhauling of the engine and the construction of new mailing cases. New and larger quarters for the marine station have also been secured at the foot of First street, Detroit.

The Detroit Graphite Co., Detroit, Mich., are erecting a new building, 53 by 74 feet and five stories in height, as an addition to their present plant. Another indication of the progressiveness of the firm is a catalogue recently issued. The book is in a class by itself, as there is very little in the way of advertising in it, most of the space being devoted to illustrating ships, bridges and buildings on which Graphite paint has been used. The illustrations, which are of a very high class of half tone work, include several United States naval vessels, lake vessels, the great Rock Island bridge and several other noted structures of that class, the Astoria hotel, the Colonial arcade of Cleveland, and many other large buildings. A few pages are devoted to a very interesting description of the process of manufacturing paint. The book is on the whole quite a distinct departure from the usual dry, uninteresting catalogue, and will, no doubt, be a success as a business getter.

The American Electric Heating Corporation, New York, has received an order from Belfast, Ireland, for a large lot of electric heating goods for use on the Oceanic and other ships now building there. A number were forwarded last week to Bremen, Germany, for the North German Lloyd Steamship Co. A big parcel is presently going to Sydney, Australia, where the heaters are largely used for household and factory purposes. These, along with smaller contracts in hand, amount to upward of $10,000. Considerable shipments are being made to the Argentine Republic and Japan, and negotiations are now in progress for a large contract for these goods for the latter country.

The George F. Blake Manufacturing Co. received a few days ago an order from the German navy for eighteen pumps. They will be shipped as soon as completed to the imperial wharf, Wilhelmshafen, Germany. The United States revenue cutter Seminole, recently launched by the Columbia Iron Works & Dry Dock Co., like all the new revenue cutters, is furnished with a complete outfit of Blake pumps, including independent air pump of the Blake vertical twin system.

Gould & Eberhardt of Newark, N. J., have sold to the Brown Hoisting & Conveying Machine Co. of Cleveland an automatic gear cutting machine of 120 by 20-inch capacity. This machine is a duplicate to one recently installed at the works of the Blake Steam pump plant at East Cambridge, Mass. It is said to be the largest size of entirely automatic gear cutting machines built.

The Stirling Co. of Chicago, builders of water tube boilers, announces an advance in price amounting to $1.25 per horse power. Russian naval officers recently visited the Stirling Co.'s plant to inspect the boilers being built for the Russian battleship and cruiser building at Cramp yard, Philadelphia.

Frank W. Ofeldt & Son, foot of 25th street, South Brooklyn, N. Y., is building a cabin cruising launch for Garrett B. Lindeman of Bethlehem, Pa. She is 55 feet in length, 10 feet beam, 3 feet 6 inches draught, and fitted with a 16-horse-power vapor engine which drives the vessel at a speed of 12 miles an hour.

SEALED proposals for furnishing about twenty-four thousand tons of armor for naval vessels will be received at the Navy Department until 12 o'clock, noon, Wednesday, May 31, 1899, when they will be publicly opened. Forms of proposal and all information may be obtained from the Chief of the Bureau of Ordnance, Navy Department, Washington, D. C. Chas. H. Allen, Acting Secretary.

3-29-99—May 11

The steamer Winifredian, another Leyland liner, was launched recently at the ship yard of Harland & Wolff, Belfast, Ireland, and will, as soon as completed, be placed in the Boston service of the line. She is 552 feet in length, 59 feet beam and 30 feet draught. She will be fitted with triple expansion engines.

The Long Island Railroad Co. has purchased the steamer Old Glory, built by Robert Palmer & Son of Noank, Conn., and which was fully described and illustrated in the Review some months ago. She was engined by the Hyde Windlass Co., Bath, Me., and is fitted with an Almy water tube boiler.

Capt. Crowley of Taunton, Mass., for whom H. M. Bean of Camden, Me., recently built a large schooner, has had plans prepared for the construction of a 450-foot, six-masted schooner to cost $100,000 and to have a capacity of 5,500 tons.

According to dispatches from Baltimore, Harry Skinner of William Skinner & Sons, ship builders, is promoting a proposition for the construction of a $200,000 dry dock.

Kelley, Spear & Co., Bath, Me., have within the past few days launched two more 230-foot barges for the Staples Coal Co., and new barges for the same firm will immediately go up on the same ways.

John E. Lingo of Philadelphia will build an ocean tug 100 feet in length to replace the tug Campania, 88 feet in length, which was sold some time ago to the Lukenbachs of New York.

Frank Mohr of the Mohr Hardware Co. of Bay City, Mich., is having built a small steam yacht which will be fitted with a Roberts' water tube boiler equipped to burn crude oil.

The new steam yacht Josephine, building for P. A. B. Widener at the yard of the Neafie & Levy Co., Philadelphia, was launched a few days ago.

James Gordon Bennet, proprietor of the New York Herald, has placed an order with William Denny & Bros., Dumbarton, Scotland, for a large steam yacht.

The Michigan legislature has changed the name of the town Sand Beach to Harbor Beach, but the harbor will probably be known to sailors for all time to come as Sand Beach.

Joseph Wharton, Elisha P. Wilbur, Robert H. Sayre, Robert P. Linderman and Beauveau Borie, directors of the Bethlehem Iron Co., South Bethlehem, Pa., have filed articles of incorporation for a company to be known as the Bethlehem Steel Co. The authorized capital is $15,000,000.

Another colored chart of the St. Mary's river (engineer chart), taking in that part of the river from the lower end of the canal to Lake Superior, has just been issued. This chart is in all respects equal to the elegant chart issued a few weeks ago, and which covers the river from the canal down to Lake Huron. These charts will be mailed to any address by the Marine Review at 50 cents each.

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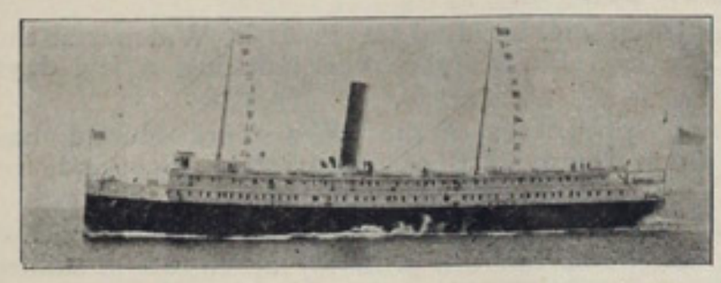

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